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NAME OF SUPERVISOR/*NOM DU DIRECTEUR DE THÈSE* DR D. A. MACKAY

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NL-339 (3/77)

THE UNIVERSITY OF ALBERTA

A STUDY OF TEACHERS' INTERACTIVE THOUGHTS

by

Ⓒ PERCY WILSON MARLAND

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
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THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled A Study of Teachers' Interactive Thoughts submitted by Percy Wilson Marland in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Elementary Education.

Supervisor

D. Massey

M. Horowitz

Susan Therrien

E.A. Holdaway

Lee S. Shulman
External Examiner

Date 25th May, 1977

ABSTRACT

Virtually nothing is known about teachers' cognitive functioning during instruction. Research has tended to ignore this topic, but recognition of the need to know how teachers cope with the demands of their task environments is increasing.

Information processing theory, a relatively new research tradition, offers means for investigating how humans function in particular task environments.

The study reported in this document was based on a review of the teacher as an information processor and sought an understanding of teachers' cognitive functioning during the interactive phase of teaching, that is, during instruction.

Six volunteers at three grade levels in two elementary schools were involved. Stimulated recall from videotapes of lessons, a branch of introspective methodology, was used to elicit data on teachers' interactive thoughts and cognitive processes. Two stimulated recall interviews were conducted with each teacher. Transcripts of teachers' introspective reports were analyzed using a content analysis system developed by the author. Other data collected to aid in the interpretation of the introspective reports included low- and high-inference classroom process data, teacher presage data, and details of pre-instructional lesson plans.

The small number of interviews and the non-random nature of the teacher sample placed severe constraints on the power to generalize. Conclusions relate only to teacher covert behavior in the videotaped lessons.

Analysis of the interview data revealed that the information processing of all six teachers tended to conform to a broad pattern. The information processed consisted principally of thoughts about lesson tactics to be used next, thoughts about past lesson events, expectations for students, and predictions about future lesson developments. Teachers also monitored classroom events, recalling what they had seen and heard—mainly gross student behavior, verbal and non-verbal—and reported their interpretations of these perceptions. In addition, teachers retrieved information about students which they had brought to the lesson, and information about a wide range of topics including curriculum experiences, teaching principles, and beliefs about children. The interview protocols contained references to teacher affective states, but few thoughts about lesson plans, lesson objectives, past teaching behavior, and its impact on students and the lesson.

Examination of the ways in which the information was processed showed that (i) teachers, in thinking about lesson tactics, frequently considered courses of action without giving attention to alternatives; (ii) teachers made few decisions; (iii) decision making was of limited rationality; (iv) teachers were not self-monitoring; (v) teachers used expectations, predictions, and subjective and unsubstantiated judgments about students in planning their teaching acts; (vi) a model of the teacher as problem solver was inappropriate to describe the covert behavior of the teachers in this study. It was also hypothesized that some cognitive behavior of the teachers could be likened to that of clinicians.

There was no prima facie evidence that the slight variations in information processing could be attributed to teacher presage factors or contextual variables.

It was also concluded that the introspective technique of stimulated recall interviewing, used in this study, offers a useful technique for investigating teachers' covert cognitive behavior.

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TABLE OF CONTENTS

CHAPTER PAGE

I. STATEMENT OF THE PROBLEM 1

Overview 1

Introduction 1

General Statement of the Problem 5

Background to the Study 6

Brief Outline of the Study 8

Significance of the Study 10

Terms 11

II. REVIEW OF LITERATURE AND RELATED RESEARCH 12

Overview 12

Review of Literature 12

Theoretical Constructs 14

Teacher as Problem Solver 14

Teacher as Information Processor 15

Teacher as Decision Maker 18

Review of Research 22

Policy Capturing Studies 22

Information Processing or Process Tracing Studies 23

Preactive Planning by Teachers 26

Interactive Decision Making 28

Teacher Awareness 32

Stimulated Recall 37

Role of the Interviewer 41

Training of Interviewers 41

CHAPTER PAGE

Training of Interviewees 42

Summary 42

III. DESIGN AND PROCEDURES 45

Overview 45

Design 45

Sample 46

Specific Problems 47

Assumptions 49

Limitations 51

Data and Data Sources 52

The Expanded Brophy-Good Teacher-Pupil Dyadic Interaction Classroom Observation System 54

High Inference Rating Scales 54

Sixteen Personality Factor Questionnaire (16PF) . . 55

This I Believe Test (TIB) 56

Minnesota Teacher Attitude Inventory (MTAI) 57

Phases in the Study 58

Preparatory Phase 58

Stimulated Recall 58

Preinstructional Interview 62

Low Inference System (Expanded Brophy-Good Teacher-Pupil Dyadic Interaction Classroom Observation System) 63

Intercoder Reliability during Training 65

High Inference Rating Scales 66

Familiarization Phase 69

CHAPTER PAGE

Data Collection Phase 70
Teacher Process Data 70
Covert Teacher Process Data 70
Overt Teacher Process Data 71
Intercoder Reliability (Low Inference Observation System) 72
Inter-rater Reliability (High Inference Scales) 74
Teacher Presage Data 77
IV. ANALYTICAL TECHNIQUES 78
Overview 78
Analysis of Stimulated Recall Protocols 78
System for the Analysis of Teachers' Interactive Thoughts 80
Reliability 84
Training of Coders 85
Estimates 85
Phenomena 88
Decision 88
Forfeit Decision 89
Deliberate Act 89
Impulsive Act 90
Proactive Teaching 90
Field Detachment Phenomenon 90
Cognitive Linking 91
Externality and Internality 91
Principle 92

CHAPTER PAGE

Belief 92

Rule 92

Case History 92

Accurate and Inaccurate Recall 93

Analysis of Preinstructional Interview Protocols . . 93

Procedures Adopted in the Use of Analytical Techniques 94

V. PRESENTATION OF DATA 96

Overview 96

Teacher Presage Data 96

Length of Teaching Experience and Sex 97

Scores on the Sixteen Personality Factor Questionnaire 98

Attitudes 103

Belief Systems 103

Stimulated Recall Data 107

Interactive Thoughts 107

Substantive Components of Perceptions 111

Substantive Components of Interpretations 111

Substantive Components of Reflections 117

Substantive Components of Anticipations 117

Substantive Components of Thoughts in the Information—Other Category 120

Feelings 124

Phenomena 128

Interactive Decisions 132

Deliberate Acts 135

CHAPTER PAGE

Preinstructional Plans 145
Teacher Process Data 148
  Low Inference Data 148
  Description of Lessons 153
  High Inference Ratings 157
Aspects of Stimulated Recall Interviews 161
  Some Aspects of Teacher Behavior in Stimulated Recall Interviews 161
    Stimulus Points in Lessons 161
    Other Teacher Response Patterns 166
  Some Aspects of Interviewer Behavior in Stimulated Recall Interviews 168
Summary 173
  Teacher Presage Data 173
  Stimulated Recall Data 173
    Interactive Thoughts 173
    Phenomena 176
  Preinstructional Plans 177
  Process Data 177
  Introspective Methodology 177
VI. DISCUSSION OF RESULTS 179
Overview 179
Information, Processes, and Phenomena 180
  Perceptions 181
  Interpretations 185
  Tactical Deliberations (Prospective and Retrospective) and Reflections 187

CHAPTER PAGE

Interactive Decision Making and Deliberate Acts of Teaching 188
  Generation of Alternatives 193
  Decision Points 194
Forfeit Decisions 196
Cognitive Linking 196
Impulsivity 197
Self-monitoring by Teachers 198
Assessment by Teachers 200
Anticipations 201
  Expectations 202
  Predictions 206
Feelings 207
Information—Pupil, Information—Other, and Goal Statements 209
  Information about Pupils 210
  Lesson Plans as Topological Work Spaces 212
  Other Information 215
    The Principle of Compensation 217
    The Principle of Strategic Leniency 217
    The Principle of Power Sharing 218
    The Principle of Progressive Checking 219
    The Principle of Suppressing Emotions 219
Introspective Methodology 222
  Conduct of Stimulated Recall Interviews 222
  Data Reduction 225

CHAPTER PAGE

Introspective Data, Its Reliability and Validity 226

Relationships between Teacher Information Processing and Teacher Presage and Contextual Variables 227

Contextual Variables and Teacher Information Processing 227

Teacher Presage Variables and Teacher Information Processing 229

VII. SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS 231

Outline of Research 231

Problems 231

Methodology 232

Analysis Techniques 232

Conclusions 233

Interactive Thoughts 234

Interactive Thought Processes and Other Phenomena 236

Decision Making 236

Expectations 236

Clinical Information Processing 237

Problem Solving 237

Principles 238

Cognitive Linking 238

Field Detachment 238

Introspective and Data Reduction Methodologies . . 238

Relationships between Teacher Information Processing and Teacher Presage and Contextual Variables 239

CHAPTER PAGE

Implications and Recommendations 239

Research 239

Teacher Education 241

BIBLIOGRAPHY 242

APPENDICES

A. DESCRIPTION OF CATEGORIES IN THE LOW INFERENCE CLASSROOM OBSERVATION SYSTEM
SECTION I. SUMMARY OF CATEGORIES IN THE EXPANDED BROPHY-GOOD TEACHER-PUPIL DYADIC INTERACTION CLASSROOM OBSERVATION SYSTEM
SECTION II. DEFINITIONS OF ONE MODIFIED CATEGORY AND TWO NEW CATEGORIES IN THE EXPANDED BROPHY-GOOD TEACHER-PUPIL DYADIC INTERACTION CLASSROOM OBSERVATION SYSTEM 253

B. HIGH INFERENCE RATING SCALES 261

C. DESCRIPTIONS OF BELIEF SYSTEMS (THIS I BELIEVE TEST) 270

D. DESCRIPTION OF AUXILIARY DIMENSIONS (THIS I BELIEVE TEST) 274

E. PROCEDURES FOR STIMULATED RECALL SESSIONS 276

F. LETTER FROM DR. N. KAGAN 283

G. PREINSTRUCTIONAL INTERVIEW 285

H. INTERCODER RELIABILITY MEASURES OBTAINED DURING TRAINING WITH THE LOW INFERENCE CLASSROOM OBSERVATION SYSTEM 289

I. INTERCODER RELIABILITY MEASURES OBTAINED DURING DATA COLLECTION WITH THE LOW INFERENCE RATING SCALES 291

J. SYSTEM FOR THE ANALYSIS OF TEACHERS' INTERACTIVE THOUGHTS 293

K. CAPSULE DESCRIPTIONS OF THE SIXTEEN PRIMARY AND FOUR SECOND-ORDER PERSONALITY FACTORS IN THE SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE 324

APPENDICES

PAGE

L. FREQUENCY DISTRIBUTION OF INTERACTIVE FEELINGS CATEGORIZED ACCORDING TO TYPE 332

M. RULES, BELIEFS, AND PRINCIPLES CITED BY TEACHERS IN THE STIMULATED RECALL INTERVIEWS 344

N. DETAILS OF TEACHERS' PREINSTRUCTIONAL PLANS 356

O. LOW INFERENCE PROCESS DATA ON VIDEOTAPED LESSONS AND TOTAL PERIODS OF OBSERVATION IN EACH CLASSROOM ON A SUBJECT BASIS 374

P. DISTRIBUTIONS OF TEACHER-SELECTED STIMULUS POINTS . . . 381

LIST OF TABLES

TABLE PAGE

1. Intercoder Reliability Measures Obtained with the Low Inference Classroom Observation System during Training 67

2. Inter-rater Reliability Measures on Eight High Inference Rating Scales during Training 68

3. Distribution of Actual Observation Periods in Classrooms across Subject, Session, Grade, and Coding Method 73

4. Intercoder Reliability Measures Obtained with the Low Inference System during Data Collection 75

5. Inter-rater Reliability Measures on Eight High Inference Scales Obtained during Data Collection 76

6. Intracoder and Intercoder Measures of Reliability in the Use of SATIT 86

7. Length of Teaching Experience of Teachers in the Sample 97

8. Sten Scores of Teachers on Sixteen Personality Factor Questionnaire 99

9. Percentile Ranks of Teachers on the Minnesota Teacher Attitude Inventory 103

10. Teachers' Scores on This I Believe Test 105

11. Percentage Distributions of Individual Teacher's Thoughts over SATIT Categories for Each Lesson 110

12. Percentage Distributions of Teachers' Perceptions Categorized According to Substantive Components 112

13. Percentage Distributions of Teachers' Interpretations Categorized According to Substantive Components 115

14. Percentage Distributions of Teachers' Reflections Categorized According to Substantive Components 118

TABLE PAGE

15. Percentage Distributions of Teachers' Anticipations Categorized According to Substantive Components 121

16. Percentage Distributions of Teachers' Use of Information—Other Categorized According to Substantive Components 123

17. Percentage Distributions of Teachers' Feelings Clustered According to Similarities 125

18. Frequencies with which Phenomena Occurred in the Stimulated Recall Protocols of Individual Teachers . . . 129

19. Number of Interactive Decisions Made by Individual Teachers in Each Lesson 133

20. Factors Considered by Teachers in Interactive Decision Making 134

21. Frequencies with which Interactive Decisions, Classified According to Node, were Reported by Individual Teachers 136

22. Factors Considered by Teachers in Planning Deliberate Acts 139

23. Frequencies with which Deliberate Acts, Classified According to Node, were Reported by Individual Teachers 140

24. Frequencies with which Lesson Plan Details Appear in Preinstructional Interviews with Teachers 146

25. Total Time Spent in Each Classroom for Purposes of Low Inference Coding 149

26. Summary of Low Inference Process Data 151

27. Average Number of Coded Events per Minute in all Language Arts and Maths Lessons 152

28. Mean Ratings of Teachers on High Inference Variables 158

29. Distributions across Lessons of Stimulus Points used in the Stimulated Recall Interviews 162

30. Percentage Distributions of Teacher-selected Stimulus Points Across Major Categories 164

TABLE PAGE

31. Basic Data on Some Teacher Behavior Patterns in Stimulated Recall Interviews 167

32. Basic Data on Some Interviewer Behavior Patterns in Stimulated Recall Interviews 169

33. Percentage Distributions of Categories of Interviewer Verbal Behavior in Stimulated Recall Interviews 171

Chapter I

STATEMENT OF THE PROBLEM

Overview

This introductory chapter seeks to provide firstly, an outline of the nature of the problem under investigation and its significance and, secondly, a brief description of the way in which answers to the research questions were sought.

Introduction

> What do we 'really' know about teaching? Young people who are about to become teachers are anxious to acquire the substantive knowledge of their chosen field; those who are already teachers would like to improve their skills; and teacher-educators would like to supply both with knowledge that has been verified through rigorous research. Unfortunately, most of these persons will be disappointed in their search for knowledge. Most of the questions they will ask have yet to be studied at all, and much of the research on teaching conducted so far does not provide adequate answers (Dunkin & Biddle, 1974, p. 11).

The claim that research in teaching has not lived up to the expectations held for it has echoed and re-echoed through the literature in education. Predictably, reactions to this notable lack of success have varied. Some proponents of competency-based teacher education programs have grown impatient with this state of affairs, have extrapolated wildly and made exaggerated claims for research. Others have alleged that teachers, by virtue of their fluctuating competency levels, subvert curriculum goals and are the major source of inefficiency in the educational process. They have sought to bypass the teacher problem by designing self-instructional programming devices which relegate the teacher to a technical function.

In a third group, this past record of research has provoked a thorough, critical appraisal of research design and methodology, and of the goals of research, resulting in a spate of recommendations for the reconstruction of educational research (Dunkin & Biddle, 1974; Good, Biddle, & Brophy, 1975; Shulman, 1970). It has also prompted a search for new ways of conceptualizing teaching and for new variables which might cast some further light on the complex relationships between contexts, teachers, and learners.

The search for the elusive criteria of teaching effectiveness has focused temporarily on such areas as teacher characteristics, the social climate of the classroom, behavioral objectives, teacher-proof curriculum materials, educational technology, and other kinds of educational innovations. The study of each has been profitable but has added marginally to an understanding of the nature of teaching effectiveness. Each, in turn, has been passed over while interest in another heightened.

In the last decade there is evidence of a new orientation and of a renewed optimism in the search for teaching effectiveness criteria. This trend is towards the study of teacher thought processes and signifies the declining power in psychology and educational research of those who have eschewed the study of covert cognitive processes. It appears to be part of a general pattern of a renewal of interest in analysis of the mediating process of thought which, according to Forehand (1966), dates from the mid-1950's. About this time information processing models based on computer analogies of the human mind provided a new language and new possibilities for studying human inquiry. More recent corroboration of this trend and its gathering momentum came from Shulman and Elstein (1975) who observed that ". . . research on mental processes is no longer treated as a skeleton in psychology's closet" (p. 30).

In research on teaching there is increasing recognition that teacher cognitions are an important mediating link between curriculum intent and classroom practice, between antecedent and consequential events in the classrooms, or between what is, at one moment in the classroom, and what comes next.

Teaching, argued Smith and Geoffrey (1968), must be seen as ". . . an intellectual, cognitive process. What goes on in the head of a teacher is a critical antecedent of what he does" (p. 96). Shulman (1970, 1974), too, has advocated the need to study the thought processes of teachers.

> It will be necessary for any innovations in the context, practice, materials, or technology of education to be mediated through the minds and motives of teachers. This will entail serious studies of the cognitive processes of teachers, their capacities and limitations, in order to develop training programs, decision aids, record-keeping technologies, and the like, to further hone the teacher's skills in adapting to learners (Shulman, 1974, p. 334).

Within the last few years also there has been a slow but discernible increase in the number of articles in which teaching is conceptualized or analyzed in terms of the covert cognitive processes of teachers engaged in their classroom functions, rather than from the point of view of an observer's coded description of overt events.

Different labels have been used to indicate a slightly different focus but the general area of interest is unmistakably the same. Teaching has been variously conceptualized as information processing (Ryans, 1963b), problem solving (Joyce & Harootunian, 1964), and, most popularly, as decision making (Bowles, 1973; Bishop & Whitfield, 1972; Clark & Joyce, 1975; Dettre, 1970; McDonald, 1960, 1965; Marx & Peterson, 1975; Morine, 1975b; Shavelson, 1973, 1976b; Whitfield, 1974a, 1974b). At a 1975 conference in studies of teaching sponsored by the National Institute of Education (NIE), the role of the teacher in aggregating, classifying, and interpreting data for use in the classroom was likened to the role of the physician in diagnosis. The term *clinical information processing* was coined to describe the planning, anticipating, judging, diagnosing, prescribing, and problem solving of teachers-in-action.

This contemporary surge of interest in the cognitive behavior of teachers promises to redress a long-standing imbalance in approaches used to study teaching. Since the 1960's studies of classroom teaching have characteristically involved the application by trained coders of observation instruments in live situations or to records of classroom events. These studies have provided valuable descriptions of the surface meaning of classroom events but were unable to tap the deep structure of meaning in classroom life—the covert goals, motives, aspirations, attitudes, beliefs, feelings, and other intellectualizations—known only by the participants in the classrooms.

Investigation of the conscious thoughts and feelings of teachers-in-action would redress the imbalance caused by the observational bias in classroom studies and, in so doing, could add new dimensions to the meaning and understanding of classroom teaching. Eventually the light these studies could cast on the relationship between the cognitive functioning of teachers and the demands of their task environments may help close the gap between educational theory and practice.

A belief, but not an uncritical one, that research into teachers' thought processes is a promising line of inquiry, has motivated this study.

General Statement of the Problem

In spite of the interest in the mental processes of teachers, signified in the literature, very little actual research on the topic has been initiated. This study is one of the first investigations in this field. Its main purposes are to:

1. investigate the interactive thought processes of teachers;
2. develop tentative descriptive models of teachers' interactive information processing;
3. develop introspective data gathering techniques for use in this study and then to assess them.

The problems to be investigated consist of four problems of primary importance and one of secondary importance. Broadly stated, the first-order questions are:

1. What kinds of information do teachers process during classroom interaction?
2. What cognitive operations, abilities, and skills do

teachers use in the interactive processing of information?

3. What other phenomena characterize teachers' interactive information processing?
4. What potential do introspective techniques hold for the study of teachers' cognitive functioning?

The second-order question is:

5. Is there prima facie evidence of links between, on the one hand, teachers' information processing styles and, on the other, contextual and teacher presage variables?

Background to the Study

The investigation of teachers' interactive thought processes was part of a larger group project which was planned to provide an understanding of teaching and learning through an in-depth study of teachers, learners, and instructional contexts in six elementary school classrooms.

The design of the larger study was based on numerous recommendations for improving and extending educational research. Many of these guidelines have arisen from recognition of the flaws and deficiencies of past classroom research, and also from a belief that new methodologies and designs appropriate to the educational research field need to be developed (Berliner, 1976; Dunkin & Biddle, 1974; Good, Biddle, & Brophy, 1975; Shulman, 1970).

Some of the broader, more fundamental guidelines used in the design of the group project have been outlined below. Many others were adopted but not presented here because they are not pertinent to that portion of the larger project with which the single study is concerned.

1. Given the paucity of the current empirical knowledge base for informing practices in teaching, a descriptive-correlational study should be undertaken to provide an in-depth understanding of classroom life and to enrich the conceptualizations of variables for use in subsequent field and experimental studies of teaching and learning.
2. A multivariate design should be used to provide independent measures of teacher and student presage factors, teacher and student behaviors in the classroom, student outcomes, and of contexts for learning.
3. Data should be gathered using existing instruments and techniques which are well tried and validated, represent conceptually independent positions, and are multifaceted to capture a variety of cognitive and affective interaction variables.
4. Verbal reports, observations, and other data pertinent to a study of teaching and learning should be sought from the subjects—teachers and students—parents of students, and official records, as well as from the perspective of the researcher.

The model used as the basis for planning this investigation of classroom teaching and learning was the one proposed by Dunkin and Biddle (1974). This paradigm presents thirteen categories of variables which have been grouped together under four larger classes labelled as *presage, context, process,* and *product* variables for research on classroom life.

This model and its accompanying rationale provided the theoretical framework for the research project. Within the larger project are set a number of smaller studies of which the investigation reported in this document is one.

Brief Outline of the Study

This study, part of the larger investigation, is principally concerned with one dimension of teacher classroom behavior which, apropos of the research paradigm proposed by Dunkin and Biddle (1974), is set within the class of *process* variables.

Teacher process behavior in the classroom has been further divided into two broad categories:

1. Overt teacher behavior, consisting of all observable teacher actions such as talk, movements, and facial expressions.
2. Covert teacher behavior, consisting of the teacher's thoughts and feelings which, subsequently, may find overt expression either verbally or nonverbally.

The dimension of teacher behavior with which this study is concerned is covert teacher classroom behavior.

The problem arising from the common humanity of the educational researcher and his subject matter is that behavior has meaning for the observer as well as for the observed, and the two meanings are not always identical. Kaplan (1964) has distinguished these two interpretations of behavior as *act meaning* (the meaning of the act to the actor) and *action meaning* (the meaning of the act to the observer). The focus on the *act meaning* of teachers in this single study, taps a virtually untouched source of information about teaching which shows promise of yielding a rich store of data on the cognitive functioning of teachers, with important ramifications for instructional theory, teacher education, and aspects of educational practice.

This study involved the collection, by introspective means, of teachers' accounts of their conscious thoughts during instruction.

Six teachers, one from each of the first, third, and sixth grade levels in each of two schools participated in the study.

Videotape records of two lessons were made in each teacher's classroom and subsequently shown to each teacher to stimulate his recall of the thoughts he was having during instruction.

The introspective records and the videotapes of lessons represent the most significant parts of the data in this study. To aid in their analysis and interpretation, the following data were also gathered in an intensive two-week period in classrooms:

1. Details of teachers' preinstructional plans;
2. A coded description of classroom events in the videotaped lessons and in an additional eight and one-half hours of instruction per teacher, over a two-week period, using a low-inference classroom observation system;
3. Ratings in a further five one-half hour periods of the teaching behavior of each subject in the study; eight five-point high-inference rating scales were used for

this purpose;

4. Presage data on the attitudes, belief systems, personalities, and teaching experience of each teacher.

Significance of the Study

The question of what kinds of information teachers process during instruction, and how they process it, has been the subject of only a few studies to date. This area of inquiry is considered to be a potentially rich source of knowledge for improving the quality of instruction, for designing curricula and educational innovations which will fit more easily the classroom world for which they were intended, and for enriching the inadequate empirical knowledge base of teacher education programs.

This project could make a contribution to a realization of that potential. In the first place it may offer some indication of the kind and quality of data which can be obtained from use of introspective techniques with teachers. The development and use of process tracing techniques in this study could provide a basis for their further refinement and could lead also to the development of alternative procedures.

Secondly, data reduction techniques developed in this project may serve as a useful starting point for subsequent attempts at construction of systems for analysing the content of teachers' introspective reports.

Thirdly, from the information which this study yields on cognitive processes of teachers during the interactive phase of teaching could emerge the broad outlines of cognitive processes, variables, and other phenomena which could well be salient factors in shaping instructional behavior in classrooms.

Terms

In this study the following terms will be used as defined.

Preactive:	a term used to denote the phase of teaching which occurs prior to instruction; it may include planning or other forms of preparation for instruction.
Interactive:	a term used to denote the phase of teaching when the teacher is involved in instructional activity with children in the classroom.
Decision:	a conscious choice.
Stimulated recall:	a branch of introspective methodology in which audio and/or visual records of a subject's past behavior are used to facilitate the subject's recall of the covert mental activity which was occurring simultaneously with the recorded overt behavior.

Chapter II

REVIEW OF LITERATURE AND RELATED RESEARCH

Overview

This chapter consists of two major sections. The first section contains a review of theories which purport to explain or represent the principal modes of thought used by teachers during instruction in classrooms. The second section contains an outline of two approaches to research in human cognitive behavior and a review of research conducted within these two paradigms on thought processes of teachers.

Review of Literature

In spite of the importance attached to the intellectual aspects of life in schools, major reviews of research into teaching reveal the relatively low emphasis on the study of cognitive processes of students and teachers. Dunkin and Biddle (1974) assert that, since 1963, this neglect has been remedied to an extent by research employing classroom observation systems developed from models of the intellectual processes, such as Bloom et al's taxonomy and Guilford's structure of human intellect.

Most, if not all, of this research uses inferential data on the cognitive processes of students and teachers provided by observers but no data provided by the subjects themselves. This has led Shulman and Elstein (1975) to observe: "Research typically slights the problem of how teachers *think about* their pupils and instructional problems; it concentrates instead on how teachers act or perform in the classroom" (p. 3).

Periodically, there have been suggestions that the study of teachers' thought processes would yield valuable information. Gage (1963) declared that ". . . the programs that teachers carry round *in their heads* need analysis" (p. 132). At intervals over the next few years Snow (1968), Smith and Geoffrey (1968), and Nuthall (1970) were to express similar points of view, to be echoed later still by Dunkin and Biddle (1974). Most recently of all, Berliner (1976), in reassessing the strong behavioristic stance of much research into teaching concluded:

> We still regard frequency counts as very useful information. But we feel quite strongly that the *qualitative* dimension, dealing with value judgments about appropriate use of skills, must enter into our observations of teaching. Researchers must address the appropriateness issue in order to study the information processing and decision making skills of human teachers. It is precisely these skills that provide the most important rationale for having human teachers in the classroom (p. 7).

Until very recently, educational researchers have paid little heed to the idea of studying the covert mental activity of teachers, probably, Shulman and Elstein (1975) suggest, because of methodological problems and a long-standing aversion to the use of introspective data. On the other hand, the inherent logic and appeal of these suggestions were not lost on writers who sought to represent teachers' preactive and interactive thought processes by means of models and descriptive theories. They have used three metaphors to provide an initial comprehension of their concepts of teaching, teacher as problem solver, teacher as information processor, and teacher as decision maker.

Theoretical Constructs

Teacher as Problem Solver

Joyce and Harootunian (1964) voiced disapproval of methods of assessing teacher effectiveness which relied on observer ratings, arguing that such means do not take into account the knowledge and intellectual processes which teachers bring to bear on events and problems in the classroom. They disputed the value of observers rating teachers on what they saw the teachers do, without relating these acts to the teachers' goals for the lesson and to the teachers' intellectual processes which precede classroom instruction.

The stance they adopted was that effectiveness criteria should be looked for in the permanent and available intellectual equipment teachers apply to classroom problems. They represented teaching as problem solving behavior, suggesting that a teacher faces an educational problem each time he perceives that an educational objective is to be achieved. The research conducted by Joyce and Harootunian investigated the problem solving behavior of teachers during preactive planning using a simulated task. Their notion of the teacher as problem solver in this context was developed from a Tylerian-based model of how teachers should plan lessons. Thus the teacher's ability to derive objectives and teaching procedures, to organize procedures, to derive evaluation procedures, and to obtain and use knowledge to attack those four tasks was seen as measures of his problem solving ability. No classroom observation was considered so that it is not clear if Joyce and Harootunian would have applied this model of teacher as problem solver to the interactive phase of teaching as well.

Jackson (1968) agreed that, on occasions, ". . . the teacher seems to be engaged in a type of intellectual activity that has many of the formal properties of a problem solving procedure" (p. 151), but he expressed reservations in applying the problem solving paradigm to all teaching behavior.

Teacher as Information Processor

In 1955, Ryans developed a theory of teacher behavior based on a premise that teacher behavior can be described in terms of general systems theory, a view which was elaborated following his teacher characteristics study.

Ryans (1963a, 1963b) proposed that the teacher functions as an information processing system, sensitive and responsive to prevailing conditions in the classroom and able to retrieve and use stored or internal knowledge, intuitions, affective data, and the like. The processing of this information culminates in overt and directly observable information-forwarding responses directed at the students. He defined information processing by teachers as the selection, preparation for transmission, and forwarding, of some meaningful information or message to students to aid them in the acquisition of an appropriate behavior repertoire. One way of conceptualizing teacher information processing, Ryans contended, was to consider the teacher's activities as a five-phase sequence consisting of:

1. sensing, identifying, and classifying information inputs;
2. evaluating potential courses of action in light of circumstances;
3. decision making, involving selection of appropriate information content and means of transmission;
4. programming (or ordering and arranging) of intended information output;
5. transmission of appropriate information.

Information flow, as conceived of by Ryans, involved the exchange of meaningful messages in the form of facts, concepts, or rules, hence information was defined narrowly as the substance of oral communication about the disciplines and did not include impressions, expectations, concerns, intuitions, and other personal subjective data.

This conceptualization of the teacher during classroom interaction appears to have lain dormant for some time though Gage (1972) alluded briefly to its potential for illuminating our understanding of the ways teachers think about teaching.

The application of the term information processing to teaching was recently revived (NIE, 1975; Shulman & Elstein, 1975) but with the addition of the qualifier *clinical*. Following research into the process of medical diagnosis and decision making, Shulman and Elstein reflected on the similarities between the roles of the teacher and the physician. The position adopted by these authors and by the NIE conference panel was that the teacher's work in the classroom involved a form of clinical information processing.

> The Panel was oriented toward the teacher as clinician, not only in the sense of someone diagnosing specific forms of learning dysfunction or pathology and prescribing particular remedies, but more broadly as an individual responsible for (a) aggregating and making sense out of an incredible diversity of information sources about individual students and the class collectively; (b) bringing to bear a growing body of empirical and theoretical work constituting the research literature of education; somehow (c) combining all that information with the teacher's own expectations, attitudes, beliefs, purposes . . . and (d) having to respond, make judgments, render decisions, reflect, and regroup to begin again (NIE Conference Report, p. 3).

This view of teaching is consistent with the perspective of the information processing theorist who regards the human processor as a goal-oriented being whose capacity to deal rationally with the environment is constrained by an inherently limited capacity for processing information (Shulman, 1976).

In at least two other major respects, Ryans' model differs from the clinical information processing view of the teacher. In the first place, Ryans chose to represent the covert cognitive processes of the teacher in terms of a sequential, five-phase, ends-means model of rational thought. This position is not adopted by Shulman and Elstein and other contemporary researchers in the information processing tradition.

The stages model for describing the way human beings think and plan has also been rejected by others. From studies in medical inquiry, curriculum decision making, and problem solving in chess, symbolic logic, and cryptarithmetic, evidence has accumulated showing that human subjects do not investigate possibilities, plan, or problem-solve in the systematic way suggested in the traditional ends-means models (Elstein, Kagan, Shulman, Jason, & Loupe, 1972; Newell & Simon, 1972; Walker, 1971).

When Jackson (1968) asked teachers to justify their professional decisions, he reported that many ". . . declared that their classroom behavior was based more on impulse and feeling than on reflection and thought" (p. 145). On the basis of this evidence, he was persuaded that the activities assumed to accompany rational thought processes such as identification of alternatives, conscious deliberation over choice of alternative, and evaluation of outcomes were not salient in the teachers' behaviors. Jackson concluded that such features of the classroom environment as uncertainty and surprise placed severe limits on the usefulness of a rational model for explaining teacher actions.

A second difference between the two information processing models is related to the outputs of the processing stage. The clinical information processing model presents a much broader view of information output, encompassing the facts, concepts, and rules of Ryans' model as well as judgments, decisions, solutions, expectations, plans, prescriptions, and diagnoses.

Teacher as Decision Maker

Application of the decision making metaphor to a description of the teacher's role appears to have caught the imagination of many. Reasons for its appeal vary. Morine (1975b) saw teaching as a chain of events which lacked cohesion and purpose unless the teacher was able to show the inter-relatedness of the links in the chain. Integrative decision making was the key to this. A similar viewpoint is presented by Shavelson (1973). Arguing that the ability to know when to use a skill rather than use of the skill distinguishes the exceptional teacher from the mediocre one, Shavelson contended that decision making was *the* basic skill.

Smith and Geoffrey (1968) enthusiastically proclaimed that a major result of their ethnographic study of a classroom was that the teacher could be viewed from the model of decision maker.

> The decision making model has tremendous possibilities in linking conceptually such diverse influences as the formal curriculum guides, the faculty peer-group beliefs and norms, and the composition of the class itself . . . and treating teaching functionally rather than just structurally (p. 92).

Teacher decision making has been the subject of quite a deal of analysis but, as Shavelson (1976b) has indicated, most of the work in this area has been limited to armchair theory.

A common assumption of many theorists is that decision making is pervasive in teaching. Gagné (1976), for example, contends that ". . . it is evident that the teacher must make a host of individual decisions concerning what kinds of stimulation to present to the learner, what communications to make, what questions to ask, what sorts of confirmation of the learners' productions to provide, and many other decisions of this general sort" (p. 21). Similar views have been expressed by other writers including Farr and Brown (1971) and Shavelson (1976b), but there are still only a few shreds of research evidence to support this claim.

Most writers have recognized that a teacher's decision making would vary qualitatively and quantitatively, depending on the context in which the decisions were being made. A typical basis for categorization of decisions is the one used by Jackson (1968) who labelled those decisions made before a lesson as *preactive* ones and those occurring during the lesson as *interactive* decisions. More detailed categorizations have been suggested by Dettre (1970), Mosston (1972), and Whitfield (1974b).

The nature of teacher decision making has often been described in terms of the multi-phase ends-means model of rational thought (Bowles, 1973; McDonald, 1960, 1965; Whitfield, 1974b), a model now considered to diverge significantly from the actual ways in which humans plan and solve problems. One of the most recent and most elaborate expositions of this view of the teacher has been presented by Shavelson (1976b) who has characterized teacher decision making as decision making under uncertainty, and has used concepts from statistical models of decision making to analyze decision making in the realm of teaching. He is careful to point out that statistical models apply to situations in which sufficient time is available to carry out the hypothesized steps in the process, a condition which seldom prevails in most teaching situations.

From this perspective, teachers' decisions are seen to have five features:

1. choice of a teaching act from a set of alternative acts;
2. states of nature (student and other contextual conditions);
3. outcomes of a particular course of action;
4. utility for the teacher of particular outcomes;
5. goal or goals the decision is intended to help attain.

In terms of these features Shavelson has characterized teachers, a priori, as ". . . rational decision makers who intuitively use evaluative information for estimating probable student states of nature and the utility of using alternative teaching methods in the presence of these various states of nature" (1976b, p. 401).

Shavelson questions whether, or to what extent, it is possible for teachers to perform in accordance with this statistical model of decision making. Development of this kind of model of teacher decision making was undertaken for heuristic purposes. Its dependence on what teaching could be, rather than what it is, has been emphasized.

Other hypothetical models have been constructed which attempt to account for variables thought to have a bearing on how teachers arrive at interactive decisions. Whitfield (1974b) identifies several major factors considered to play an important part in teacher decision making: teacher's background information and experience; teacher's value system and role identity; pupils; institution; educational aims; curriculum content and materials; and the teaching situation or context.

Both Shavelson and Whitfield have mentioned the role of the subconscious in teacher decision making. The former has suggested that some decisions are made subconsciously, the latter that the points at which teachers perceive the possibility of choice and how they make decisions are related to the *deep structure* of teaching, that is, the motives and goals of the teacher. Within the deep structure of teaching, the concept of psychological stress was thought by Whitfield to be important. Whitfield (personal communication, 1976) has commented that the question of how to define the term *decision* in teaching has not been adequately attended to. His attempt to solve the definitional problem has centered on monitoring the stress levels of teachers in classrooms by using physiological measures and visual cues from videotapes.

Review of Research

Research into teacher cognitive processes could be placed in one of two major categories identified by Shulman and Elstein (1975):

1. research in the policy capturing tradition;
2. information processing or process tracing research.

Policy Capturing Studies

Policy capturing research has adopted the *black box* paradigm in that no attempt is made to study the intellectual processes of judging, decision making, and problem solving per se. In this approach the principal task is to analyze input-output relations of the information processing systems, the ultimate goal being to find, as a substitute for the intervening cognitive processes, a mathematical formula which will predict with reasonable accuracy the human judgment, decision, or diagnosis. The mathematical formula does not replicate or model actual intellectual processes and is thus a paramorphic representation of them.

There is virtually no policy capturing research on teachers. To the present time, only one study (Mondol, 1973) has been encountered. In other areas, such as clinical psychology and medicine, studies using Bayesian and regression techniques to capture the policies of judges and clinicians are more numerous. Though not directly relevant to this study, the studies tend to support a general research-based consensus about the limited capabilities of humans to process information (Miller, 1956; Newell & Simon, 1972) and are listed here briefly for that reason.

1. In some situations humans are poor intuitive statisticians. They place inappropriate faith in early trends; they tend to overemphasize positive information and fail to give adequate weight to negative instances; they base decisions on stereotypes even when objective information is available and contrary; they are conservative and gather far more information than they need (Shulman & Elstein, 1975).
2. Clinicians tend to be rather unreliable. Their judgments are ". . . only minimally related to the confidence and to the amount of experience of the judge . . . relatively unaffected by the amount of information available . . . [and] rather low in validity on an absolute basis . . ." (Goldberg, 1968, p. 485).

Information Processing or Process Tracing Studies

By contrast with policy capturing studies, information processing research attempts to describe or characterize in detail the actual intellectual processes of human subjects as they attempt to solve problems, reach decisions, or make judgments. Their goal is to produce a one-to-one correspondence between parts of their explanatory model and phases in the actual intellectual process. Their descriptions are thus isomorphic rather than paramorphic.

Research of this kind has been undertaken in several fields, notably medical inquiry (Elstein, Kagan, Shulman, Jason, & Loupe, 1972; Sprafka & Elstein, 1974), teaching and learning (Bloom, 1954; Kagan, Krathwohl, Goldberg, & Campbell, 1967; Shulman, 1965; Shulman, Loupe, & Piper, 1968), chess (de Groot, 1966), clinical psychology (Kleinmuntz, 1968), and problem solving in chess, symbolic logic, and cryptarithmetic (Newell & Simon, 1972).

Typically, the approach in information processing research is to obtain introspective reports from subjects performing tasks in real-life situations or in simulated environments. By analyzing the verbal protocols produced by self report, think aloud, and stimulated recall techniques, the researcher seeks to determine characteristics of the subject's cognitive processes. The goal is understanding and explanation, which has prompted some to label this research as atheoretical. Certainly, if it is to be regarded as theory, then it is *humble* theory or descriptive theory. A notable exception is Newell and Simon's seminal work on developing a theory of problem solving.

Newell and Simon began with the postulate that ". . . thinking can be explained by means of information processing theory" (p. 5), and went on to define the shape of such a theory, the salient features of which are:

1. it purports to explain behavior not just to describe it;
2. it posits a set of processes or mechanisms that produce the behavior of the thinking human;
3. it is a theory of the individual (idiographic rather than nomothetic); it attempts to represent in some detail a

particular person at work in a particular task and is not restricted to offering generalizations about man;

4. it is an empirical not an experimental theory;
5. it is dynamic theory in the sense that it describes system changes over time;
6. it is closely linked with task content; as well as accounting for the psychology of the subject, information processing theory has to account for the demands of the task environment.

Information processing research generally has tended to link up with psychological research on memory, cognition, language, and logic (Shulman & Elstein, 1975). Information processing studies of the teacher could also draw on other sources such as research into attribution theory, person perception studies, and investigation into process ability for assistance in the interpretation of data and for providing methodological clues. Though the implications of research in these areas for the classroom still have to be investigated and spelled out (Brophy & Good, 1974), the potential value of an integration of research findings from these areas has already been demonstrated (Morine & Vallance, 1975).

To date, reports on five information processing studies focusing on the teacher either in the preactive or interactive stages have appeared (Clark & Joyce, 1975; Kagan, Krathwohl, Goldberg & Campbell, 1967; Marx & Peterson, 1975; Morine, 1976; Morine & Vallance, 1975; Oberg, 1975; and Shulman, 1965). Two other process tracing studies in education have been conducted but they have been concerned mainly with the mental life of students in classroom settings (Bloom, 1954; Taylor, 1968).

In the remaining section of this review, the findings of these process tracing studies will be integrated with conclusions from other related research. Reports on stimulated recall, a branch of introspective methodology, will also be reviewed because of its significance in this study.

Preactive Planning by Teachers

Most of the literature on instructional planning or decision making is prescriptive. As Morine (1976) has pointed out in her thorough review of the topic, there is a startling lack of research on the subject of instructional planning in general. Virtually nothing is known about the cognitive processes of teachers during preinstructional planning sessions.

Marx and Peterson's (1975) report was one of the few in this area. The primary goal of their research was to develop a methodology for investigating preactive decision making phenomena in teaching. They had teachers employ a talk aloud technique when planning. The study established the worthwhileness of this technique to the investigators' satisfaction. The major finding reported was that teachers varied considerably in their orientations to planning, but this has to be considered in the light of the research setting which was a laboratory one without the familiar classroom conditions and constraints.

In England, Taylor (1970) engaged in open undirected discussions with teachers to gain insights into their planning. No content analysis was attempted but Taylor sought to highlight recurring themes in the talks and pinpoint salient issues. Topics frequently referred to included nature of educational aims, importance of selecting content, available resources, constraints of time and syllabus, interests and capabilities of learners, and, above all else, the needs of students. Taylor did not attempt to trace planning processes though he did speculate on some alternatives used by teachers.

As part of a program of research to identify promising new variables in teacher effectiveness, Berliner's team of researchers studied preactive planning in a semi-naturalistic setting (Morine, 1976). In this study teachers were asked to keep readable notes on their planning for two lessons and to respond, in writing or on audiotape, to a set of questions about their strategies. Certain characteristics of teacher planning were noted. Teachers tended to be specific in their planning, used outline form, and wrote objectives in non-behavioral terms, but made little reference to evaluation procedures, instructional alternatives, or to pupils' academic preparation for the lesson.

Oberg (1975) designed a computer program intended to reveal the characteristics of the information search strategies used by teachers in a simulated lesson planning task. The subjects of this study were experienced teachers who were provided with simulated data on a class of Grade 2 students for whom they were asked to plan a language arts lesson. The computer program required the teachers to retrace and define their conscious planning strategies which, according to Oberg, they were able to do for all but 2% of the time. Analysis of the computer data showed that teachers relied to a large extent on their own experience and store of knowledge in formulating their plans, considered pupils most frequently, and used slightly more practical knowledge than theoretical. Oberg found no evidence that teachers screened, analyzed, compared, or reconsidered the bits of information they used. She also reported that there were virtually no instances when teachers modified their intentions.

Two other studies are of interest, though the focus of concern is not preactive planning but rather the inquiry behavior of prospective elementary teachers in tasks simulating aspects of a classroom's problems (Shulman, 1965; Shulman, Loupe, & Piper, 1968). Both sets of subjects were confronted with in-basket materials which required them first to define the problems that they would attend to. Subjects were required to think aloud as they coped with the potentially problem-rich materials. Following the first project, Shulman concluded that precise and meaningful descriptions of inquiry behavior could be made without necessarily defining for subjects the problems to be solved and, secondly, that individual differences in problem sensing and problem solving styles could be understood in terms of personality variables. The second study provided confirmation of the validity of using personality and cognitive-style variables to predict the inquiry behavior of student teachers.

Interactive Decision Making

Because research interest in interactive decision making is so very recent, it should not be surprising that there were only two reported studies on this topic (Marx & Peterson, 1975; Morine &

Vallance, 1975).

Both studies used stimulated recall procedures; both studies confirmed that teachers at the elementary school level made interactive decisions about a variety of matters, principally, verbal interchanges, implementation of preactive plans, and unplanned activities.

Marx and Peterson expressed dissatisfaction with the data-reduction system used for coding the stimulated recall protocols. The same system was used for both preactive and interactive protocols and reportedly was lacking in sensitivity to differences in teachers' decision making styles. The categories in the coding system were based on the linear ends-means model of planning. Morine and Vallance (1975) considered it problematical whether these categories would capture the phenomena of planning and interactive decision making as they naturally occurred.

Since this study was an exploratory one and primarily for the purpose of developing a methodology, Marx and Peterson did not venture any generalizations, however they identified two interesting leads. First, teachers who were highly productive preactive decision makers tended to have students with more negative attitudes. Also, teachers who tended to make fewer preactive decisions were more productive interactive decision makers and these were the teachers with more positive attitudes. Secondly, a significant negative correlation ($p < .01$) was reported between extent of teacher focus in the stimulated recall interview on lower-order subject matter such as facts and figures, and levels of student abstract reasoning. In a later analysis of this data, Clark and Peterson (1976) drew several other, but nonetheless tentative, conclusions. They noted that ". . . it is relatively rare for teachers to be thinking about alternative actions or strategies while they are teaching" (p. 4), and that when they did consider alternatives it was because things were going badly and secondly, that the interactive decision making of teachers in the sample was not aimed at optimizing instruction. Teachers appeared to be satisficers rather than optimizers. Thirdly, they concluded that the cues most frequently used by teachers to judge the degree of success of the instructional process were pupil participation and involvement.

Morine and Vallance (1975) reported finding only slight variations in teacher responses on the stimulated recall interview on the basis of grade level differences. No differences were significant but they saw a pattern of responses emerging which suggested that teachers with low pupil gain scores consistently mentioned a larger number of items that they had taken into account in their decision making. The researchers speculated that perhaps effective teachers screen information more easily and select for use the more appropriate data or, alternatively, that the teachers with low gain scores are the more perceptive, and that greater awareness of classroom stimuli and pupil cues hampers their abilities to process the data and take appropriate actions.

Shavelson (1976b) has examined a body of available empirical literature relevant to his statistical model of teacher decision making outlined earlier. He cited several papers that supported the claim that humans are fairly good intuitive statisticians, a view not shared by others referred to earlier. Shavelson believes that a rational model of teacher decision making is not unrealistic though he notes some provisos: (i) teachers are subject to predictable biases; (ii) teachers may be dissuaded from using the best alternative if it threatens their self-image; the decisions they make may minimize stress rather than optimize student outcomes; (iii) "teachers may not be rational decision makers when removed from the laboratory situation and placed in a classroom with the responsibility of teaching thirty children" (p. 401). Two studies reviewed by Shavelson lend some weight to the third point.

Faced with this challenge to the assumption of rationality or approximate rationality, Shavelson searched the available empirical literature for answers to three questions:

> "To what extent can teachers identify alternative teaching acts?
>
> Can they estimate accurately the probability that each state of nature characterizes the learner?
>
> Can they estimate the probable outcomes of a particular teaching act under a particular state of nature " (p. 386).

In relation to the first question, Shavelson reviewed nine reports and concluded that ". . . teachers are capable of considering alternative choices of teaching methods, but they probably differ considerably in their ability to do so" (pp. 387-388). Apparently the material reviewed studied generation and choice of alternatives in non-classroom settings. He also pointed out that there is no current knowledge on the relationship between quality of decision making by teachers and quantity of alternatives used, and that guidelines for judging the probable effectiveness of these alternatives do not presently exist.

In relation to the second question, nothing is known, Shavelson claimed, about teachers' ability to estimate the probability of various states of nature relevant to classroom teaching because the topic has not been researched. His ". . . best guess . . . is that teachers' estimates of states of nature are moderately inaccurate and susceptible to predictable errors in judgment" (p. 391).

In relation to the third question, Shavelson noted that the whole question of measurement of the values to an individual of alternative outcomes is a controversial one but apparently could find no research evidence bearing on the issue since none was cited.

In their careful micro-ethnographic study of an inner-city classroom, Smith and Geoffrey (1968) explored decision making as a process for establishing the social system of the classroom. They noted that much of the teacher's conscious efforts were related to the development of a coherent, smoothly functioning social system in the classroom. Kounin's (1970) studies also indicated that the teacher thinks as much about the social dimension of the classroom as he does about the activity structure.

Teacher Awareness

Teacher awareness, the extent to which the teacher has consciously noted aspects of his own behavior, its impact on pupils, and other pupil cues and behaviors, has been considered as a likely predictor of teaching effectiveness (Good & Brophy, 1973; Brophy & Good, 1974). It has been argued by these authors that the teacher who takes in more of these kinds of stimuli and information would be in a better position to take appropriate action than the teacher who is less aware. Research which would cast light on the validity of this assertion has not yet been conducted, however, Kounin's (1970) studies of the relationship between teachers' classroom management behaviors and pupil behaviors might be construed as providing some support. High scores on *withitness*, which implies that the teacher is alert to deviancy and makes few errors in desisting pupil deviant behavior, were associated with better class ratings on pupil work involvement and low deviancy rates.

Though research on the link between teacher awareness and pupil outcomes is lacking, some indication of the level of teachers' awareness is available. Six studies reviewed by Good and Brophy have consistently shown that teachers are unaware of much of what they and their students do in the classroom. Further evidence of this was provided by Withall (1972) and Flanders (1970) who have remarked on the disparity between what actually happened in a lesson and teachers' retrospective estimates of those events, even on gross measures such as percentage of teacher-talk time in a lesson.

Morine and Vallance (1975) attempted to find out which pupil behaviors elementary teachers attended to during Reading and Maths lessons, using a post-lesson sorting technique. Teacher responses on the task varied only slightly on the basis of grade level differences or lesson content. The only significant difference ($p < .05$) was that teachers with high pupil gain scores used more single element (one child) groups. Other differences approaching a .05

level of significance were found which, taken in conjunction with other close-to-significant findings from the study, caused Morine and Vallance to speculate that teachers with high and low pupil gain scores differed in their attention to cognitive aspects of pupil behavior, teachers with high pupil gain scores paying more attention to cognitive aspects of the lesson than those with low gain scores.

This study also confirmed a finding in the Stanford study (Clark & Peterson, 1976) that pupil response and participation were the cues that teachers observed most frequently.

There is also some evidence suggesting that teachers may not be able to make accurate estimates of learners' states-of-mind, that is, they lack awareness of what students are thinking and feeling covertly. Two studies (Bloom, 1954; Taylor, 1968) indicated that teachers were unable to make accurate inferences about the covert cognitive behaviors of their students because the visual cues and feedback provided by the students were not helpful, perhaps even misleading.

Another factor which could be operative here is the *field detachment* phenomenon, first noted by Kagan, Krathwohl, Goldberg, and Campbell (1967). In two laboratory studies of teaching and learning involving just two subjects, a teacher and a pupil, Kagan et al reported that there were instances when the teachers alternately focused attention on the student and then became preoccupied with something else to the extent of excluding any awareness of his own words or the student's. These changes in focus usually occurred when the teacher was forced to restructure the lesson presentation by a student's question

> In this process the individual 'tunes out' whatever is happening at that time and turns his mind momentarily to review, to plan subsequent behavior, to assess the course of the learning-teaching situation, or otherwise to examine the interaction in which he is involved (Kagan et al, 1967, p. 369).

This phenomenon was revealed in stimulated recall sessions with both teacher and student and occurred several times. It has not been reported elsewhere.

A recent report by Elliott (1977) of a program of action research into the problems of implementing inquiry-discovery approaches in a small, unrepresentative sample of 40 elementary and secondary classrooms in the United Kingdom sheds further light on the topic of teacher awareness. The findings are not generalizable but instructive nevertheless. Elliott claimed that ". . . many of the problems of implementing discussion-based inquiry approaches were caused by teachers' habitual and unconscious behavior patterns" (p. 2). Eventually these problems were partially overcome. Teachers were able to modify their behaviors to suit the inquiry approach by, first of all, becoming aware of their unconscious patterns of behavior and reflecting on the theories implicit in them.

Self-monitoring was the key concept in efforts to increase teacher awareness of their behavior and its impact on learners. Self-monitoring, defined as the process by which ". . . one becomes aware of one's situation and one's own role as an agent in it" (p. 5), was seen as a necessary condition for awareness.

Elliott distinguished three categories of teachers in the project:

1. teachers who had adopted an objective stance towards their own practice but who needed assistance in constructing an accurate account of what they did;
2. teachers who were ready to adopt an objective stance because they viewed their teaching as problematical;
3. teachers who are neither willing nor able to reflect objectively on their classroom behaviors.

An a posteriori assignment of the teachers by Elliott and other research staff to the three categories resulted in the following assessment. When the project started ". . . only one of the 40 teachers was self-monitoring to any significant extent. Another 12 probably had some genuine sense of their teaching being problematic. Two-thirds of the teachers fell into the third category" (pp. 5-6).

The question of how representative of teachers this group is cannot be answered but the little evidence that is available suggests that it may not be atypical.

A method of initiating self-monitoring habits in teachers was developed because of the teachers' extreme reluctance to seek feedback and because of their lack of success on the few occasions when they tried. The technique, called triangulation, involved gathering reports of lessons from three different sources—the teacher, the students, and a participant observer—and using them to formulate new techniques or approaches for testing and then adoption to realize their goals. The author reported a measure of success with this method, claiming that 25 of the 32 teachers who remained in the project to its completion had made some progress in self-monitoring.

Stimulated Recall

The stimulated recall technique is a method of obtaining from a subject a retrospective account of his covert mental activity which co-occurs with the subject's overt behavior. An audiotape or videotape record of the subject's overt behavior is used to stimulate recall of the simultaneously occurring covert cognitive behavior. The stimulated recall procedure typically involves the subject or interviewee whose cognitions are to be disclosed, and an interviewer, whose role is to facilitate such disclosure. Kagan, Krathwohl, and Miller (1963) assert that, prior to their use of videotapes in interpersonal process recall, sound tapes only had been used in stimulated recall experiments.

Stimulated recall procedures have been used, but not extensively, in studies of the processes of medical inquiry (Elstein & Shulman, 1971; Elstein, Kagan, Shulman, Jason, & Loupe, 1972), in studies of teaching and learning (Bloom, 1954; Kagan, Krathwohl, Goldberg, & Campbell, 1967; Marx & Peterson, 1975; Clark & Peterson, 1976; Morine & Vallance, 1975; and Taylor, 1968), and in studies of counselor-training in the field of mental health (Kagan, 1972; Kagan, 1973; and Kagan, Krathwohl, Goldberg, & Campbell, 1967), where it has been referred to as interpersonal process recall (IPR).

Those who have used the stimulated recall procedure have reported positively on its value, commenting that it has proved promising and that it has yielded rich, interesting data. Others have also noted the extraordinary richness and complexity of such verbal reports (Stone, Dunphy, Smith, & Ogilvie, 1966).

To obtain this otherwise inaccessible introspective data, process tracing research is dependent on the ability and willingness of subjects to verbalize covert thoughts and feelings, and to do so accurately and as completely as possible. It is therefore based on the assumption that verbalizations about covert intellectual behavior are reasonably accurate representations of that behavior.

Introspection, generally, has some implacable opponents though no adverse criticism of the stimulated recall procedure itself has been encountered by this writer. Users have been careful to state assumptions and limitations of this method.

Introspective data and techniques generally have been viewed with suspicion and disapproval, mainly by those psychologists who reject the view that investigation of conscious mental experience is a legitimate concern of psychology. A more fundamental reason for their opposition to it stems from their notion of objective experimentation, namely, a singular focus on observable events verifiable by others. They do not approve of introspection as a method suitable for the behavioral sciences because of the potential for error in introspective reporting, and because of the difficulty in confirming that events as recalled did occur.

The views of these psychologists have been quite influential in the behavioral sciences though some waning of their influence has been noted (Forehand, 1966; Radford, 1974), especially since the advent of information processing theory in the 1960's and with the strong interest and approval shown this type of research.

Burt (1962, 1968), Kaplan (1964), and Radford (1974) have urged a reconciliation of the factions who are for and against introspection. They have supported the inclusion of introspection in the methods of behavioral science, arguing that

1. infallibility of method does not exist in science and so it is unreasonable to reject a method merely because it is not errorless. All observation is subject to error so ". . . certainty in science is unobtainable" (Radford, p. 248);
2. data on covert mental processes, accessible only through introspection, is a valuable part of the data in the behavioral sciences; Kaplan puts the case succinctly: "I do not see how one can disagree with Colley's . . . remark that 'in investigating persons there are advantages to being a person.' Thereby we are given continuous access to the subject matter" (p. 141);
3. introspection is necessary because it brings to light new facts which might otherwise have been overlooked and because it brings new questions to the fore;
4. introspective data are not without some checks on subjectivity.

One check on accuracy is to use multi-level protocols. Elstein and Shulman (1971), for example, in their study of the medical inquiry process used videotapes, think-aloud protocols, and stimulated recall protocols for cross-referencing on recall items. In respect of this problem, a crucial role can be played by the interviewer who, by judicious questioning, can promote accuracy and completeness of recall.

Other precautions can also be taken to enhance the probability of accurate recall. The first of these concerns temporal proximity of the recall session to the actual event. Investigations conducted by Bloom et al (1954) using audiotapes of lessons to stimulate recall of students' concurrent thought processes, showed that students were able to recall overt events with up to 95 percent accuracy within 48 hours of the lesson. The procedure they used was to stop the tape at several points and ask students what happened next. It was found that ability to recall began to decline after about 48 hours. From this Bloom inferred that recall of covert processes would be similarly high if recall occurred as soon as possible after the lesson but within 48 hours. This inference was based on the assumption that recall of covert processes would be about the same as recall of overt behaviors.

The second precaution concerns preparation of the interviewee. Shulman (personal communication) recommended that the subject be fully briefed on the goals of the research project and the purposes to be served by the stimulated recall technique. He suggested that subjects, if not told, may construct their own *theory* about the interviewer's intentions and could respond accordingly in ways which may distort the data, and subvert, unintentionally, the investigator's purposes.

Because the stimulated recall procedure is a relatively little-used one, there is scant evidence on several matters and hence few well-established or reliable guidelines.

Role of the Interviewer. In some studies of teaching and learning (Marx & Peterson, 1975; Morine & Vallance, 1975) which have involved use of stimulated recall procedures, the role of the interviewer has been defined simply. The interviewer was required to ask a structured series of questions at specific points in the replay of the lesson. Reports of the remaining studies in this field, and of the medical inquiry studies, contain brief, sketchy remarks on the interviewer's role. On the other hand, Kagan et al (1967) have carefully detailed the part to be played by the inquirer or interviewer in the preparation of counselors in mental health. In this research the interviewer used a stimulated recall approach with client and trainee-counselor separately. A videotape of the interviewer-client stimulated recall sessions was then shown to the trainee-counselor for the purpose of improving his interpersonal skills and to make the trainee more attentive to the verbal and nonverbal cues provided by clients.

The interviewer role, as conceived by Kagan et al, emphasized the importance of affective dimensions such as supportiveness, respect, patience, interest, understanding, and empathy, and stressed the need for the interviewer to listen, to be as unobtrusive as possible, to inquire rather than inform, to focus attention on the client and the videotape, and to facilitate self-discovery by the client.

Training of Interviewers. Only one study (Kagan, Krathwohl, Goldberg, & Campbell, 1967) reported on the preparation or training of interviewers and this, presumably, was because of the relative complexity of the role in that research project. These authors reported that, in their experience, the interviewer role was much more easily conceptualized than enacted. Consequently they developed a program to train interviewers in this role.

Training of Interviewees. Training of subjects in reliving experiences and verbalizing covert processes was not given in any of the studies. Subjects—whether teacher, student, client, counselor, or physician—usually received a brief explanation of what they were required to do. In one case (Kagan et al, 1967), this was extended to include the assumptions underlying the use of the stimulated recall method and the purposes, because ". . . it seemed to be helpful if clients were given an explanation which might help them understand the purposes of the process . . ." (p. 12).

Summary

In the quest for laws of teaching, teachers and teaching behavior have long been foci of educational research. What teachers know, believe, say, and do in the classroom, and their personalities and other characteristics have been researched numerous times.

One topic not favoured with systematic, sustained inquiry until very recently, mainly because of strong philosophical opposition to the kind of research it necessitates, but which is now considered to be deserving of further examination, is the cognitive functioning of teachers—how teachers think and plan.

Teachers' mental processes have been represented as problem solving, decision making, and information processing. The last of these perspectives allows a more complete view of covert cognitive behavior. It encompasses both of the other conceptions of teaching but is not restricted to representing how teachers think in terms of problem solving and decision making only. A variety of theoretical models, usually based on the premise that human thought is rational, have been constructed to promote empirical inquiry into how teachers solve problems and make decisions.

Actual research into mental processes has taken two distinct forms. The first uses statistical concepts to construct mathematical models of how teachers behave cognitively. The goal in this kind of research is to begin with an analysis of the processor's inputs and outputs and to develop a statistical, and therefore paramorphic, model of thought processes. In subsequent manipulations of input data, the statistical technique will yield outputs consistent with the human processor it is representing.

The second method employs introspective data from subjects engaged in tasks with a variety of cognitive demands. The data are analyzed in an effort to trace thought patterns and sequences and to develop descriptive, isomorphic models of thought processes. Stimulated recall, a form of introspective methodology, has been used to obtain retrospective reports of thought processes.

Research into teachers' covert cognitive behavior during the preactive and interactive phases of instruction has only just begun. Consequently, at this time, the few findings which have been reported can be couched only in the most cautious and restrictive of terms. No generalizations exist. Research reports do contain a number of interesting tentative results, which probably warrant further investigation, and optimistic statements about the value of the introspective data and techniques.

Chapter III

DESIGN AND PROCEDURES

Overview

This chapter begins with a description of the research design, sample used, specific problems to be investigated, the assumptions underlying the research, and its limitations. In subsequent sections there are accounts of the data collected in the study and of the development and use of procedures for gathering the data.

Design

The research project was planned as a small-scale descriptive study in a naturalistic setting. It was considered that these design features would be appropriate for the following chief reasons:

1. Investigation of the interactive thought processes of teachers is only in its infancy, only a very few exploratory studies having been undertaken to date. Therefore, to provide a data base for further theory building, an important first step is to undertake a small-scale descriptive study in natural classrooms to seek an initial understanding and explanation of the phenomena of interactive information processing by teachers.
2. The study should be conducted in a naturalistic setting to ensure, as far as possible, that variables and relationships investigated in subsequent laboratory or field experiments adequately reflect naturally occurring phenomena.

3. In the relatively new tradition of information processing research, methods of gathering and analyzing introspective data are in an early stage of development. "In process tracing, the distillation of a model from masses of introspective data remains more an art than a science" (NIE, 1975, p. 49). Given this lack of methodological maturity, process tracing studies in education should proceed cautiously at first to allow development and refinement of instruments and techniques to occur.

These three premises constituted the major parameters shaping the design of this study.

At a more specific level, consideration was also given to design features which would yield data needed for a vigorous treatment of research questions. Two other principal guidelines established were that—

1. Some contextual variability in school, grade level, and subject matter would be necessary.
2. Research should be conducted in a relatively brief but intensive period.

Finally, practical constraints such as available manpower, resources, and time were, of necessity, taken into account.

Sample

An approach was made to several schools in an attempt to locate teachers from a range of grade levels who would participate in the study. The sample obtained consisted of—

1. Two elementary schools within the same school system, located several miles apart in a largely residential community in a large urban center.

2. Six teachers, one at each of the first, third, and sixth grade levels in both schools.

No sampling procedures were used in the selection process. The two schools used in the study were chosen because they were the first two schools in which teachers at the required grade levels volunteered to participate.

The schools (referred to subsequently as School 1 and School 2) cater for children of both sexes in the kindergarten to grade six age range. They are of approximately the same size with student enrolments of 450 to 530. Since both schools are under the jurisdiction of the same school board they are subject to the same staffing policies and curriculum requirements and have the opportunity to exercise a similar degree of autonomy in relation to implementing the curriculum. School plant, equipment, and resources appear similar though School 1 is of more recent construction.

All the classrooms in which the research was undertaken were self-contained. One grade six class was accommodated in a temporary classroom.

Specific Problems

The specific problems to be investigated relate to—

1. Kinds of information that teachers process during the interactive phase:

   What are the substantive components of teacher's interactive thoughts?

   What pupil behaviors and cues do teachers attend to?

2. Ways in which information is processed by teachers in the interactive phase:

   What intellectual processes characterize the interactive information processing of teachers?

   What is the relationship between preactive plans and interactive thought processes? Do preactive plans impinge on the interactive thoughts of teachers? If so, to what extent?

   What is the ratio of impulsive to reflective action by teachers in the classroom?

   Do teachers make interactive decisions? If so, how frequently? about what? how?

3. Other phenomena which characterize teachers' interactive information processing:

   Do teachers process information in accordance with consciously held theories, beliefs, and principles?

   Are teachers self monitoring?

   Are teachers aware of the expectations they hold for pupils? How do they use expectations during instruction?

   What other significant features appear in the information processing of teachers?

4. Potential of introspective methodologies for investigating cognitive function of teachers during instruction:

   What difficulties, problems are likely to be encountered in the use of stimulated recall?

How might such troubles be avoided in future studies?

5. Prima facie evidence of relationships between variables pertaining to contexts and teacher presage factors and the information processing styles of teachers:

   Is there evidence of differences in the information processing of teachers? Of teachers at different grade levels?

   Could information processing styles be related to teachers' belief systems, attitudes to children, experience, and personality characteristics?

Assumptions

This investigation of the interactive thought processes of teachers is based on a concept of the teacher as an information processor. The assumptions on which this view of the teacher is based are:

1. A teacher can be viewed as a human information processing system. The structure of such a system includes means of acquiring, manipulating, storing, retrieving, and disseminating information.
2. Information, either as input to, or output from, the teacher is diverse, may take a variety of forms, and comes from a variety of sources both internal and external to the teacher.
3. A teacher's interactive thoughts are, in large measure, the determinants of teacher actions in the classroom,

hence teaching behaviors are intentional and purposive.

4. Ways in which teachers use or process information are also varied and may include diagnosis, prediction, rendering judgments, making decisions, responding, and solving problems.
5. The teacher's task environment abounds with so much information that it far exceeds ~~the capa~~city of the teacher to deal with it. As a result the teacher usually acts with intended rationality but this rationality is bounded in part by inherent limitations in the capacities of the teacher to process information.
6. Both the information which a teacher processes and the ways in which it is processed are a function of the interactions between the unique personality of the teacher, the task environment, and the teacher's unique perception of it.

It is also considered that use of a process tracing approach in studying teachers' interactive thought processes is appropriate. This approach is based on the following assumptions:

7. Interactive information processing by teachers is susceptible to verbal characterization.
8. Introspection is an appropriate technique for eliciting data on teachers' covert thought processes.
9. Verbal reports of interactive thought processes produced by teachers under conditions of stimulated recall from videotape are reasonably accurate representations of the

actual processes.

10. Introspective reports are legitimate data for gaining an understanding of the interactive cognitive functioning of teachers.
11. It is not necessary for teachers to undergo any training to be able to report accurately the substance of their interactive thoughts.

Limitations

The principal limitations of the study are:

1. Samples of schools, teachers, and lessons were small.
2. Random sampling techniques were not used in the study.
3. Characteristics of task environments in which the teachers worked, considered to be a significant factor in shaping teachers' cognitive behavior, were not standardized.

These limitations are such that it will not be possible to make generalizations about individual teachers or to make definitive comparisons across the sample or between two teachers.

Data and Data Sources

The data obtained to investigate the stated problems and the sources or procedures used to obtain the data are outlined below.

Data	Data Sources/Procedures for Obtaining Data
Videotapes of lessons	Twelve 30 to 45 minute lessons were videotaped, two per teacher, one in Language Arts the other in Mathematics. In the Grade Six classes both videotaped lessons were in Language Arts. These videotapes were used to stimulate recall of teachers' interactive thought processes.
Interactive thought process data	Stimulated recall interviews were conducted as soon as possible after each of the 12 videotaped lessons. The interviews, ranging from 45 minutes to nearly two hours in duration, were audiotaped. Typewritten transcripts of these interviews were then prepared. Procedures for conducting stimulated recall interviews and role definitions of both interviewer and interviewee were developed (see Appendix E).
Details of preactive planning of teachers	Preinstructional interviews were conducted just prior to each of the 12 videotaped lessons to obtain details of the nature of

Data	Data Sources/Procedures for Obtaining Data
	preactive plans made by teachers. An interview schedule was developed to obtain this data (see Appendix G).
Coded description of videotaped lessons	As each videotaped lesson was being taught an observer coded classroom interactions in the lesson using a multi-faceted low inference instrument, the Expanded Brophy-Good Teacher-Pupil Dyadic Interaction Classroom Observation System. This instrument was used as a basis for selecting some recall points in the lesson for use in the stimulated recall interview and as a means of categorizing classroom incidents about which teachers gave introspective data.
Teacher process data	Data on an additional nine hours (approximately) of teaching behavior per teacher were obtained using the low inference system referred to above and eight high inference five-point rating scales. These data were obtained principally for the use of other investigators in the group project. In this study, the data will be used in the interpretation of interactive data.

Data	Data Sources/Procedures for Obtaining Data
	Observations and ratings were made in Language Arts and Mathematics (Language Arts only for Grade Six teachers).
Teacher presage data (personality variables, belief systems, attitudes)	Cattell's 16 Personality Factor Questionnaire (16PF), Forms A and B; O. J. Harvey's This I Believe Questionnaire; Minnesota Teacher Attitude Inventory (MTAI).

The Expanded Brophy-Good Teacher-Pupil Dyadic Interaction Classroom Observation System

This is a comprehensive low-inference classroom observation instrument. It was designed to capture the naturally occurring sequences of teacher-student interaction in elementary classrooms as well as every dyadic interaction between the teacher and a student. In addition, the instrument takes into account contextual differences and is based on real and psychologically meaningful units of classroom interaction (Brophy & Good, 1969, 1970; Brophy & Evertson, 1973). The authors report that it is possible to train coders to reach an 80% agreement criterion using a strict definition of agreement. For an outline of this system see Appendix A, Section I.

High Inference Rating Scales

High inference five-point rating scales were used to provide observer ratings on eight discrete variables (see Appendix B). Four of these variables were taken from the work of Kounin (1970). They are:

1. Withitness—the ability to communicate to pupils awareness of what is going on in the classroom, that is, having eyes in the back of your head.
2. Overlappingness—the ability to deal with more than one matter in the classroom concurrently.
3. Smoothness—the ability to maintain the ongoing flow of academic events without giving attention to self-initiated intrusions.
4. Momentum—the ability to maintain the pace of the lesson without overdwelling and/or fragmentation.

The remaining four variables used in rating teachers were:

5. Clarity—as measured by a scale developed by Emmer (1972).
6. Persuasiveness—as measured by a scale developed from the concept of therapist persuasive potency (Truax et al., 1968).
7. Warmth—as measured by a scale adapted from Truax's scale of nonpossessive warmth (Truax, 1971).
8. Empathy—as measured by the Carkhuff revisions of the Truax scales for empathic understanding (Carkhuff, 1969).

Sixteen Personality Factor Questionnaire (16PF)

The 16PF, developed by Cattell, is an objectively scorable personality test for use with individuals aged 16 and above. The personality profile provided by the test rests on measurement of 16 dimensions from within the context of a general theory of personality.

Although the 16PF, like other measures of personality, has received some criticism, it is generally held to be one of the best measures of personality presently available (Buros, 1972). It has been refined over a period of more than 30 years of factor analytic research on normal and clinical groups. Several measures of test-retest reliability over short and long periods have been obtained. Dependability (short term) coefficients range from .65 to .93 with 80 percent above .8 and stability (long term) coefficients from .63 to .88 with 90 percent above .7 (Cattell, 1972, p. 10). High construct validity coefficients have been claimed by Cattell. These range from .53 to .94 with 70 percent above .7 (Cattell, 1972). All coefficients were based on combined administration of Forms A and B of the questionnaire. Administration of combined forms has been found to provide substantial increases in both reliability and validity. This procedure was followed in the present study. The 16PF has been recommended for use in derivation of prediction and classification functions in those situations in which scale or profile interpretations are not desired (Buros, 1972).

This I Believe Test (TIB)

This test is a projective test of personality developed by O. C. Harvey (1964, 1965). It classifies teachers on the abstract-concrete continuum on the basis of their responses to a paper-and-pencil test of belief systems. Subjects respond to a number of socially and personally based referents by completing the statement, "This I believe about . . .". The developer claims that, from the degree of absolutism, tautologicalness, novelty, evaluativeness, and simplicity-complexity of the completions, respondents can be classified as belonging to one of four principal belief systems

(Harvey et al, 1966). Descriptions of the four belief systems are presented in Appendix C. The instrument also yields scores on seven auxiliary dimensions which are described in Appendix D.

Results in numerous studies using the TIB test have consistently shown that teachers' belief systems are related to their classroom styles. In brief, concrete teachers were less resourceful, more dictatorial, and more punitive than abstract teachers (Brophy & Good, 1974). Harvey (1974) reports:

> The TIB test has been used in well over 100 studies by us and others in this country and abroad and has been found to yield consistently valid outcomes (p. 1).

Interjudge reliability on test scoring of .91 has been reported by the author.

Minnesota Teacher Attitude Inventory (MTAI)

This instrument was designed to measure teacher attitudes to teacher-pupil relations which predict how well the teacher will get along with pupils (Cook, Leeds, & Callis, 1951, p. 3).

There has been frequent analysis, reanalysis, and criticism of the MTAI since its development. It appears that criticism is based largely on the fact that developers and subsequent users have advocated its use in teacher selection and guidance, and its validity for that purpose has not been established. The designers have reported split-half reliability of .93 and retest reliability of near .70, though this falls dramatically if subjects have had a traumatic experience with students between test and retest. Very large differences also exist in the median scores of different groups, making across-group comparisons very hazardous. Three studies of validity have resulted in coefficients of .46, .60, and .63. In each study criterion measures were provided by principals, students, and visiting experts.

In spite of its limitations, the MTAI has been regarded as a promising research tool but has to be used cautiously.

Phases in the Study

There were three distinct phases in the research project. The first or preparatory phase involved development of instruments and training in the use of these and others to be used in the research. A school not involved in the actual research project was used for training purposes. The second phase was the familiarization period when researchers spent time in classrooms. The third phase entailed collection of data.

Preparatory Phase

The process tracing approach has been used so rarely in studies of teaching that few research instruments or procedures were available. Consequently development of research methods was a first priority.

Stimulated Recall

A conceptualization of the roles of teacher and interviewer in stimulated recall sessions was developed, based on the work of Kagan et al (1967), who used stimulated recall in training counselors for the field of mental health. The theoretical rationale for this conceptualization was first subjected to academic scrutiny, following which a pilot study, involving two researchers and two practising teachers, was conducted. The pilot study demonstrated to the researchers' satisfaction the viability of the procedures for stimulating recall of interactive thoughts from videotape. A portable videotape recorder (Sony VTR AV3600) with video input from one camera equipped with zoom lens (Sony AVC3200) was used in the pilot study.

On the basis of this first trial, written materials were prepared to provide a basis for communicating a description of roles and procedures to teachers and interviewers in the study.

Several weeks prior to commencement of data collection, arrangements were made for investigators actually engaged in the use of stimulated recall to develop expertise in the interviewer role. Three interviewers were used, the two involved in the pilot study and one other. All three were graduate students in Education and each had had extensive teaching experience in elementary or secondary schools, or both, and at the tertiary level.

Training in the interviewer role involved conducting a stimulated recall interview followed by self, peer, and teacher evaluation of the interview which had been audiotaped. It provided valuable experience in the interviewer role and, in addition, indicated a number of ways in which the procedures to be adopted could be improved. For example, the value of previewing the videotape of the lesson before conducting the interview was clearly demonstrated. It was also considered advisable that practice videotaping be done in the classroom prior to videotaping a lesson for stimulated recall purposes to accustom teacher and students to the filming process and, also, to reduce the likelihood of inducing or causing any significant departure from usual or regular patterns of behavior in teachers and students during the collection of research data.

Two methods of interviewer evaluation were tried. On one occasion two observer-interviewers were present during the stimulated recall interview and the audiotape of the interview was replayed for group assessment by teacher, interviewer, and observer-interviewers. In this situation the teacher appeared inhibited, resulting in a largely unproductive interview. It was considered that group size and the presence of observers may have been partly responsible for this and so, subsequently, the second method was used. Under this method no observers were present during the interview and an evaluation was conducted by replaying an audiotape of the interview. The notion of using a videotape of the stimulated recall interview for subsequent evaluation of the interviewer was considered, but discounted, because facilities for unobtrusive videotaping did not exist and it was considered that, if the videotaping could not be done unobtrusively, an inhibitory effect similar to that caused by presence of observers may have occurred.

In evaluation of interviewers, conformity to the role definition was stressed. Breaches of the role, especially in relation to the kinds of questions asked and interviewer impact on the teacher, alternative patterns of interviewer response, and missed cues in teacher comments were principal foci of attention. Importance was attached in the training period to getting feedback from teachers relating to their affective reactions in the interview setting and feedback on the extent to which they felt they were being coerced, even subtly, to say things which they had not been thinking interactively.

Preparation for the role of interviewer occupied several days in an intensive three-week period of training in the use of this and other techniques employed in the research project.

Training in the interviewer role continued to the point where it was felt that interviewers had a thorough understanding of the nature of the role and were able to enact it without infringing the major principles embodying it.

A trial was also conducted to see whether video inputs from two cameras, one focusing on the teacher, the other on the class, to produce a split image of teacher and class on the TV screen, would result in improved conditions for stimulating recall by teachers. It was concluded that one camera, focusing on the teacher and those pupils he was interacting with or observing, provided adequate coverage of classroom events for purposes of stimulating teacher recall. The advantages, if any, of a two-camera setup—there was no consensus on whether there were any major advantages—seemed to be outweighed by the relative simplicity and greater technical reliability of equipment used in a single camera production.

After the period of training, materials relating to use of the stimulated recall interview in the research were further modified and used as they appear in Appendix E.

A copy of the stimulated recall interview materials developed for use in this project were recently submitted to Dr. Norman Kagan of Michigan State University to obtain his reaction to them. Dr. Kagan has used stimulated recall procedures extensively in various fields of research. His reaction to this material appears in Appendix F.

Preinstructional Interview

Development of this interview schedule was based on the need to have details of the plans teachers had made for the lessons used in the stimulated recall interviews. The process of lesson planning was not of interest in this project. The purpose to be served by such an interview was to obtain information on the details of preinstructional plans made by teachers.

An unsuccessful search for suitable existing instruments was made. Taylor (1970) used a questionnaire approach but he was interested in a broad range of planning questions. Marx and Peterson (1975), working with Joyce at Stanford, developed the *talk aloud* technique for recording what a teacher was thinking about while planning, an approach which Morine (1976) considers may prove valuable.

Since no instrument was found which would serve the research purposes of this project, an interview schedule was developed which was intended to fulfil the requirements outlined above. An article by Cannell and Kahn (1968) provided useful guidelines for developing this interview schedule. Since the written plans of teachers are often in the form of skeleton outlines and do not necessarily contain all the plans that teachers have in mind, it was deemed that the most appropriate means of obtaining information on preinstructional decisions was to interview teachers and record the dialogue.

The interview schedule was subjected to a brief series of trials with three teachers and modified on the basis of feedback from them about what aspects of their planning it failed to capture. The preinstructional interview materials that were used in this study appear in Appendix G.

Because the skills necessary for conducting the preinstructional interview were very similar to those required for the stimulated recall interview, no special training sessions were instituted though all three researchers who would be using this instrument were fully acquainted with their role in this interview.

Low Inference System (Expanded Brophy-Good Teacher-Pupil Dyadic Interaction Classroom Observation System)

Training in the use of this low inference system involved three coders and occupied a large proportion of the three-week intensive training period preceding the familiarization phase. The manual developed by the authors was used and general recommendations for training received in personal communication with Dr. J. Brophy were adopted. Three classrooms representing a spread of grade levels were used for training purposes.

Initially some time was spent in discussing system categories and in practice coding from transcripts of lessons to provide a working knowledge of the system. Towards the end of the first week of training, live coding was commenced. The procedure adopted was that of spending short periods in the classrooms and then retiring to compare results with the aid of an audiotape of the lesson.

One major difficulty was encountered during the training period and it persisted even as coding skills increased. The problem stemmed from the fact that coders missed slices of classroom life whilst recording observations on coding sheets, a problem which was exacerbated as the pace of classroom life increased. Coders found that the task of recording observations directly on to coding sheets interfered with efforts to capture the flow of classroom events. The problem was resolved by a decision to record all coded observations on audiotape as they occurred. Coders could thus keep their eyes constantly on events in the classroom and, at the same time, record coded classroom interactions.

This technique was used as unobtrusively as possible; it received no adverse comment from any teacher in either the school used for training purposes or those used in the research project itself, and provided an additional bonus. Portions of classroom discourse were also recorded and provided opportunities for leisurely verification of live coding.

Two minor modifications were made to the system during the training period. These changes were made because it was considered that they enabled a more accurate description to be made of ways teachers provided feedback to pupils in academic response opportunities. To the ten categories of teacher feedback reaction in academic response opportunities, two were added:

1. affirmative teacher reaction (AFFIRM);
2. repeats student statement (REP SS).

These changes were effected by retaining nine of the ten original categories as defined in the original system and by dividing the *no feedback reaction* category into two parts, to allow finer distinctions to be made (see Appendix A, Section II).

Intercoder Reliability during Training. Reliability was calculated using a formula proposed by Brophy and Evertson (1973) which they claim is a more stringent method than is usually used. The formula is—

> Percentage agreement = number of coding decisions made by both coders and agreed upon divided by itself plus the number of coding decisions not agreed upon plus the number of codings made by the first coder but not the second plus the number of codings made by the second coder but not the first.

An 80% agreement criterion was sought in training and was frequently achieved however it was not always possible to do so, the main factor contributing to this being the one noted also by Brophy and Evertson (1973) namely, the ". . . difficulty of 'catching everything' during bursts of activity . . ." (p. 11). The reliability measures tabled in Appendix H compare favourably with those reported by Brophy and Evertson who regarded their results as generally satisfactory. They noted that many of their results were lower than 80% but regarded most as satisfactorily high, given the strictness of the criterion.

Many of the results appearing in Appendix H are spuriously high (or low) because of the extremely low frequency of occurrence of some variables. For example, if a behavior occurs once only in a lesson and is coded by both observers, 100% agreement results. On the other hand, if one coder doesn't see the event then percentage agreement is zero. For this reason, only percentage agreement results for variables with a frequency of occurrence of more than 10 are listed in Table 1 as examples of reliability measures achieved during training.

High Inference Rating Scales

Training consisted of approximately 12 hours of initial discussion for purposes of clarifying the meanings of variables. Practice in the use of the scales was then carried out in a school not used in the actual project. Three teachers each at a different grade level were used in five practices. Training continued until a criterion level of 80% agreement was reached.

Inter-rater reliability was calculated using percentage agreement among the three raters. Percentage agreement was calculated using this formula:

$$\text{Percentage agreement} = [(1 - \frac{R_H - R_L}{4}) \times 100]\%$$

where R_H and R_L are the highest and lowest ratings respectively on any one variable for any one period of observation, and 4 is the maximum difference possible on a five-point rating scale.

Intercoder reliability figures obtained during the training period are presented in Table 2.

Table 1

Intercoder Reliability Measures Obtained with the Low Inference Classroom Observation System during Training

Variable	% Reliability for Pairs of Coders (N=3)	Mean
Acad. resp. opportunity		
Type of respondent	82,80,82	81.3
Question type	73,30,36	46.3
Child answer	85,64,69	72.7
Teacher feedback	43,60,60	54.3
Dyadic contact		
Type	65,86,84,92,76,92	82.5
Child created contact		
Type	90,83,96,79,87,95	88.3
Child created contact (wk.-rel.)		
Teacher feedback (delay, brief, long)	79,86,79,78,100,88	85.0
Teacher afforded contact (wk.-rel.)		
Teacher feedback (delay, brief, long)	31,59,32	40.7
Teacher feedback (+, -)	33,100,33	55.3

Table 2

Inter-rater Reliability Measures on Eight High Inference Rating Scales during Training

	Percentage Agreement				
	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
Variable	Teacher 1	Teacher 1	Teacher 2	Teacher 3	Teacher 1
Withitness	75.0	68.7	75.0	80.0	97.5
Overlappingness	85.0	75.0	75.0	70.0	82.5
Smoothness	87.5	80.0	50.0	80.0	97.5
Momentum	90.0	77.5	57.5	90.0	82.5
Clarity	92.5	75.0	80.0	85.0	87.5
Persuasiveness	100.0	77.5	85.0	57.5	97.5
Warmth	82.5	80.0	72.5	67.5	87.5
Accurate Empathy	80.0	85.0	87.5	100.0	87.5

Familiarization Phase

A familiarization period of one week was spent in the classrooms of the six teachers participating in the research project. Each researcher spent alternate days in the two classrooms assigned to him. During that time each researcher—

- arranged with the teachers to be introduced, or to introduce himself, as a visitor to the classroom with an interest in schools and classrooms. Every effort was made to ensure that students did not identify members of the research group with the authority structures of the school board, school, or classroom;
- familiarized himself with classroom routine;
- memorized the names of the students in both classrooms, a preprequisite for intended use of the low inference coding system;
- videotaped the class at work and provided opportunities for teachers and students to view the videotapes of themselves and also to become accustomed to the presence in the classroom of the videotaping equipment;
- informed teachers of the kinds and purposes of interviews and other instruments, providing them with the materials which had been especially prepared for this purpose; also, discussed with teachers their roles in each of the interviews to clarify their roles and to answer any questions;
- practised using the high inference and low inference systems for coding classroom behavior;

- arranged a schedule for videotaping lessons in the data collection period and for conducting the preinstructional and stimulated recall interviews;
- arranged to administer the teacher presage questionnaires (16PF, MTAI, and TIB) at times suitable to teachers and schools. Substitute teachers were employed to replace project teachers in the classrooms for the half day needed to administer the tests.

Data Collection Phase

Teacher Process Data

Three investigators were involved in the collection of teacher process data. Each was assigned to two classrooms. One investigator was assigned to one Grade One class in both schools (1 and 2), a second to one Grade Three class in both schools, and the third to one Grade Six class in both schools.

All teacher process data were collected in both schools within a period of two weeks, except in the case of one Grade Six teacher where, because of the teacher's absence, the data were collected in the first and third weeks after the period of familiarization in schools.

Five days were spent in each classroom over the two weeks. Research data were collected by each investigator spending alternate days in the two classrooms for which he was responsible.

Covert Teacher Process Data. Each investigator arranged with both teachers for whom he was responsible to conduct the necessary interviews and videotape a Language Arts lesson, selected by the teacher, at a mutually convenient time. With all six teachers, the sequence followed in data collection was as indicated below and occurred within a nine hour span on the day on which each lesson was taught:

i. preinstructional interview conducted;

ii. lesson videotaped (and coded using the low inference classroom observation system);

iii. stimulated recall interview conducted.

This sequence was repeated in the second week with all but one of the six teachers. In this one instance the data were obtained in the third week after the familiarization period. The second videotaped lesson was in Mathematics for Grade One and Grade Three teachers but in Language Arts for Grade Six teachers, neither of whom taught Mathematics. On the second occasion the lesson to be videotaped was once again chosen by the teacher.

Overt Teacher Process Data. The low inference system (Expanded Brophy-Good System) and the set of eight high inference rating scales were used to describe classroom behavior of teachers. High inference ratings were made at periods other than those times when the low inference systems were used.

Guidelines adopted and used, where class schedules permitted, were:

i. Total period of recorded observation in classrooms— 9 hours in each of the Grade One and Three classrooms, 7 1/2 hours in both Grade Six classrooms.

ii. Observation was restricted to lessons in Language Arts and Mathematics at the first and third grade levels, and to Language Arts lessons in Grade Six.

iii. Time spent in observation in the two subject areas reflected the ratio of times allocated to Language Arts and Mathematics in the class timetable, approximately 3:1 respectively.

iv. Low inference and high inference coding occupied roughly four-fifths and one-fifth respectively of the total period of coded observation.

v. The duration of each period of high inference rating of teacher behavior was one-half hour. Each investigator also made an end-of-day rating for each day spent in the classroom.

vi. Recorded observations were made in morning and afternoon sessions with both low and high inference systems.

Class timetables and unscheduled classroom events caused deviations from the guidelines. For example, no coding of Mathematics lessons occurred in some grades in the morning because this subject was taught only in the afternoon. Table 3 shows how periods of coded observation were spread over session, subject area, and method of data collection.

Intercoder Reliability (Low Inference Observation System). Coders were trained to criterion level prior to the actual data collection and therefore coded alone during the study proper. Because of the difficulty in achieving

Table 3

Distribution of Actual Observation Periods[a] in Classrooms across Subject, Session, Grade, and Coding Method

Observation Method	Low Inference								High Inference							
Subject	Language Arts				Mathematics				Language Arts				Mathematics			
Time	AM		PM		AM		PM		AM		PM		AM		PM	
Session[b]	S_1	S_2	S_3	S_4	S_1	S_2	S_3	S_4	S_1	S_2	S_3	S_4	S_1	S_2	S_3	S_4
School 1 Grade I	3	8	1				3		2	1	1				1	
III	6	4					4		2	2					1	
VI	7	5							3							
School 2 Grade I	5	7					3		1	1	2				1	
III		6	6		3					2	2		1			
VI	6	6							1	2						

[a] A period of observation is a half hour.

[b] Each day in both schools consists of four sessions:

S_1 8:40 a.m. - 9:50 a.m.
S_2 10:05 a.m. - 11:15 a.m.
S_3 12:35 p.m. - 1:45 p.m.
S_4 2:00 p.m. - 3:10 p.m.

80% agreement in all categories during training, it was deemed advisable to take reliability checks on each coder during data collection.

Intercoder reliability checks were conducted in each classroom and on occasions spanning the two week period of data collection where teacher and investigator schedules permitted. An effort was also made to do a reliability check in each classroom with the home room coder paired first with one of the two remaining coders and then with the other. This was achieved in four of the six classrooms. Thirteen separate checks were made with at least one check made in each classroom. These measures of intercoder reliability are reported in Appendix H. The same strict definition of agreement was used as discussed earlier. Only percentages of agreement for variables with frequencies over 10 are reported in Table 4 for reasons stated earlier. These results indicate a satisfactorily high level of agreement.

Inter-rater Reliability (High Inference Scales). Reliability checks between pairs of raters were made during the data collection period. An attempt was made to follow the guidelines outlined for obtaining inter-rater reliabilities in the use of the low inference system. Altogether nine checks were carried out in five of the six classrooms. Results, indicated in Table 5, were regarded as generally satisfactory.

Table 4

Intercoder Reliability Measures Obtained with the Low Inference System during Data Collection

Variable	% Reliability Measures for Pairs of Coders	Mean
Acad. resp. opportunity		
Type of respondent	85,91,71,50,79	75.2
Question type	88,86,77,89,82,55,83	80.0
Child answer	85,90,75,52,89	78.2
Teacher feedback	73,76,69,66,74	71.6
Student initiated question		
Teacher feedback	60	60.0
Student initiated comment		
Type	50,71	60.5
Relevancy	44,75	59.5
Teacher feedback	44,57	55.5
Dyadic contact		
Type	84,73,73,56,83,89, 56,85,88,83	77.0
Child created contact (wk.-rel.)		
Type	62,69,80,81,80	74.4
Teacher feedback	41,71,75,79,67	66.6
Teacher afforded contact (pers.-rel.)		
Type	76,74,67,43,85,77,90,55	70.9
Teacher afforded contact (wk.-rel.)		
Teacher feedback	67,83	75.0
Teacher afforded contact (proc.-rel.)	50,100,89,22,100,88	74.8

Table 5

Inter-rater Reliability Measures on Eight High Inference Scales Obtained during Data Collection

	School 1					School 2			
	Grade I	Grade I	Grade III	Grade III	Grade VI	Grade III	Grade III	Grade III	Grade VI
	Coders 1 & 3	Coders 1 & 3	Coders 2 & 3	Coders 2 & 3	Coders 1 & 3	Coders 2 & 3	Coders 2 & 3	Coders 1 & 3	Coders 2 & 3
Variable	Day 3	Day 6	Day 5	Day 9	Day 8	Day 8	Day 10	Day 10	Day 8
Withitness	85.0	85.0	72.5	--	90.0	87.5	70.0	70.0	82.5
Overlappingness	87.5	82.5	67.5	--	100.0	82.5	72.5	92.5	100.0
Smoothness	97.5	87.5	70.0	--	92.5	95.0	72.5	95.0	87.5
Momentum	92.5	87.5	55.0	--	100.0	80.0	82.5	85.0	82.5
Clarity	92.5	75.0	62.5	--	95.0	60.0	82.5	90.0	100.0
Persuasiveness	97.5	97.5	70.0	67.9	92.5	75.0	100.0	100.0	100.0
Warmth	87.5	92.5	72.5	90.0	90.0	97.5	92.5	100.0	95.0
Accurate Empathy	82.5	62.5	92.5	100.0	97.5	92.5	95.0	92.5	92.5

Teacher Presage Data

The Sixteen Personality Factor Test, the This I Believe Questionnaire, and the Minnesota Teacher Attitude Inventory were administered by the same investigator to the three teachers in both schools on successive days. Procedures for administering the instruments were strictly adhered to. Teachers were relieved of their classroom teaching duties for the day by substitute teachers.

Chapter IV

ANALYTICAL TECHNIQUES

Overview

In this study an introspective technique, stimulated recall, was used to obtain data from teachers about their thoughts during the interactive phase of teaching.

A system for analysing the content of the stimulated recall interviews was developed. Development of this system is reported in this chapter, together with definitions of other phenomena identified in the verbal report data.

This chapter also includes an outline of the method used in the analysis of teachers' verbal reports of their preinstructional plans.

Finally, an outline is provided of how the analytical techniques were applied to the interview data.

Analysis of Stimulated Recall Protocols

The verbal reports of teachers obtained during the stimulated recall interviews consist of interactive thoughts and, in addition, much data which falls outside the meaning ascribed to the term *interactive* in this study. The appearance in the protocols of both kinds of data, interactive and noninteractive thoughts, was not unexpected. Procedures were adopted during the interview to have teachers distinguish between the thoughts they were having during instruction and those which occurred prior to, or after, instruction.

Teachers frequently crossed from the interactive domain to the noninteractive, and for a variety of reasons. In many instances, close ties were seen to exist between teachers' interactive and noninteractive thoughts. As familiarity with the data increased it was recognized that, in the noninteractive segments of the protocols, teachers often divulged the origins, causes, and bases of their interactive thoughts. It was considered that analysis of only the interactive data, following dichotomization of the protocols on an interactive-noninteractive basis, could deprive the interactive data of additional dimensions of meaning.

A decision was made to exploit the data as fully as possible by analyzing all the protocol data. This was achieved without forsaking the distinction between interactive and noninteractive thoughts.

The first stage in protocol analysis was a micro-level analysis of interactive data. At this level identification and categorization of molecular thought units was the principal goal.

At a second level the interactive portions of the protocols were examined to identify phenomena of a molar kind. This macro-level analysis was also extended to the noninteractive data. Phenomena are thus of two kinds, those that are interactive in nature because they occur only within the stream of conscious thoughts the teacher is having during instruction and those that are imbedded in both the interactive and noninteractive data.

System for the Analysis of Teachers' Interactive Thoughts

Because communication is an intrinsic part of all social interaction, investigation of the processes and content of communication has long been a part of social science research. Thus a long and useful research tradition, known as content analysis, exists.

Content analysis is described by Holsti (1968) as a ". . . multipurpose research method developed specifically for investigating a broad spectrum of problems in which the content of communication serves as the basis of inference" (p. 597).

Analysis of the verbal protocols of teachers in stimulated recall interviews fitted comfortably within the broad spectrum of problems defined by Holsti as ones in which the application of the content analysis mode of research was appropriate. The System for Analyzing Teachers' Interactive Thoughts (SATIT) was developed on principles and requirements for the design of a content analysis system as outlined by Holsti.

There are three generally agreed on requirements for a content analysis system (Holsti, 1968).

1. The requirement of objectivity stipulates that the categories for analysis must be stated objectively to ensure that application of the category descriptions by different analysts to the same pieces of communication will produce the same results.
2. Content analysis must be systematic. Content to be subjected to analysis must be included or excluded according to consistently applied rules.

3. The third defining characteristic of content analysis is generality. Findings must have theoretical relevance.

Content analysis involves division of the content of communication into units which are subsequently placed into categories, each category distinguishable from all other categories and defined by certain unique properties. This dual process of unitization (or segmentation) and categorization, referred to simply as coding, is ". . . the process whereby raw data are systematically transformed and aggregated into units which permit precise description of relevant content characteristics" (Holsti, 1968, p. 644). In content analysis research, the central problems are choice of unit and the selection and definition of categories for classifying units. The integrity of a content analysis scheme is dependent on the clarity, precision, and objectivity with which rules for coding communication into units and categories can be stated. Analysts are urged to follow these guidelines in formulating coding rules which are the operational links between theory and data.

1. Selection of the unit should be based on which unit will best meet the requirements of the research problem.
2. Definition of categories requires that the categories—
    - (i) represent elements in the investigator's theories;
    - (ii) be exhaustive to ensure that all data relevant to the study can be classified;
    - (iii) be discrete so that no unit can be placed in more than one category.

Within the framework provided by the aforementioned guidelines, development of SATIT proceeded on a trial-and-error basis. Samples of protocols from all teachers were used in the system's developmental stage. A full description of the system is provided in Appendix J but, briefly, principal components of the system are—

1. a set of guidelines for distinguishing between interactive and noninteractive data;
2. an ideational unit similar to the one used by Bloom (1954) for studying the interactive thoughts of students. The unit in SATIT was defined, initially, as that segment of the protocols which is centered on a single thought and, subsequently, it was defined in terms of the application of cognitive processes to referents such as classroom personalities, events, items, and ideas;
3. eleven categories into which the units are classified. These categories, briefly described, are—
   - *Perceptions:* units in which the teacher reports a sensory experience.
   - *Interpretations:* units in which the teacher attaches subjective meaning to his perceptions.
   - *Prospective Tactical Deliberations:* units in which the teacher is thinking about (identifying, evaluating, etc.) what he plans to do at some future point in the lesson or beyond it.
   - *Retrospective Tactical Deliberations:* units in which the teacher is contemplating a course of teacher action which he has already used in the lesson.

- *Reflections:* units in which the teacher is thinking about past aspects of, or events in, the lesson other than what he has done.
- *Anticipations:* speculative thoughts or predictions made interactively by the teacher about what could, or is likely to, occur in future phases of the lesson.
- *Information—Pupil:* units in which the teacher's thoughts are centered on his prelesson knowledge of the students.
- *Information—Other:* units in which the teacher's interactive thoughts are focused on other information which the teacher brings to the lesson such as general knowledge, preinstructional plans, school policies, and educational theory.
- *Goal Statements:* units in which the teacher's thoughts are about intended pupil outcomes.
- *Fantasies:* units in which the teacher is expressing fanciful, extravagant, or bizarre thoughts.
- *Feelings:* units in which the teacher is reporting emotions experienced during the lesson.

After the protocols had been broken down into units, and the units placed into the eleven categories of the content analysis system, all the units in each of six categories (*perceptions, interpretations, reflections, anticipations, information—other,* and *feelings)*, from the protocols of all six teachers were further analyzed in terms of the referents (persons, objects, events, etc.) to which the thought processes were applied.

Reliability

All stimulated recall protocols were coded by the investigator. To provide a check on system and investigator reliability two procedures were adopted. Firstly, sample segments from the protocols were coded on two separate occasions by the investigator. From the results, intracoder reliability, an index of stability of the investigator's coding, was obtained. Secondly, to provide a check on system reliability, two people independent of the research project team were trained in the use of SATIT. Intercoder reliability figures were also obtained.

In both instances, Scott's formula for calculating reliability (inter- and intracoder) was used. The choice of this formula was based on Holsti's (1968) assertion that, of several methods of computing reliability applicable to content analysis, ". . . Scott's formula, which provides a conservative estimate of reliability appears to be the most useful" (p. 660). Ober et al (1971) describe the Scott formula in these oversimplified terms. It ". . . can be thought of as the percentage of a rater's agreement with himself with correction for chance factors and the perfect rating [and also as the] percentage of rater agreement between the observer and expert, with correction for chance factors and the perfect rating" (p. 79).

The Scott formula is:

$$\text{Reliability} = \frac{P_o - P_e}{1.00 - P_e},$$

where P_o represents the agreement between two observers and P_e represents the agreement between two observers that occurs simply by chance.

Training of Coders. Two students in a doctoral program in Elementary Education were invited to act as coders. Minimal training of ten hours was given, consisting of discussion of the unit, categories, and other features of SATIT, and practice in coding.

After the period of training, each judge was asked to code independently a sample of 15 segments from the stimulated recall protocols of all six teachers. This sample consisted of 12 segments chosen by random means. The remaining three segments were added to those chosen randomly to ensure that thought categories with extremely low frequency of occurrence were represented in the sample.

During the training period the definitions of categories were frequently challenged but remained intact. No definitional modifications were deemed necessary but the system manual (see Appendix J) could now be rewritten to include additional guidelines which emerged during training discussions and which trainee coders found useful for improving categorization of units.

Estimates. The results of reliability checks appear in Table 6.

Defining an acceptable level of reliability is a contentious matter. Since there is no universally acceptable single level, the determination of an appropriate level in content analysis research should be made, according to Holsti (1968), in the context of a given research problem, when complexity of the content analysis system and the significance of the research problem should be kept in mind.

In this investigation an intercoder reliability coefficient of .70 was considered as quite satisfactory because of the complexity

Table 6

Intracoder and Intercoder Measures of Reliability in the Use of SATIT

Intracoder Reliability		
Occasion	No. of Segments Coded	Coefficient of Reliability
1	4 (from teachers 1.1,3.2,6.1)	.88
2	4 (from teacher 1.1)	.82
3	4 (from teacher 1.2)	.81
4	8 (from teachers 3.1 and 3.2)	.89
5	8 (from teachers 6.1 and 6.2)	.83
Intercoder Reliability		
Investigator and coder 1		.73
Investigator and coder 2		.67

of the system and the use of a formula giving a conservative estimate of reliability. Both results were in the vicinity of .70 and were interpreted to mean that the content analysis system is a reliable instrument.

Two factors were responsible for suppression of intercoder reliability below what, retrospectively, was considered an attainable level with this instrument. Firstly 10 hours of training were regarded as the minimum time in which a reasonable degree of proficiency could be attained. A longer period of training is needed to achieve higher reliability. The second and major factor was the independent coders' lack of familiarity with classroom and lesson contexts and their lack of knowledge of the teachers. A fuller appreciation of the meaning of the interactive data could have been achieved by the coders through time consuming observation and study of the videotapes of lessons used in the stimulated recall interviews, a procedure which could not be used because of time constraints and because it would have constituted an infringement of the guarantee of anonymity for participating teachers.

Subsequent to the initial check of intercoder reliability, reliability figures were re-estimated after removing from the sample those units in which knowledge gained during observation of the lessons could significantly affect categorization. Fewer than one-tenth of all units were omitted but their removal resulted in increases in reliability figures of at least five percentage points.

Measures of intracoder reliability resulted in reasonably high levels of short term (up to two months) stability in coding by the investigator.

Phenomena

The following phenomena were identified in the interactive segments of the stimulated recall protocols. Guidelines which were adopted for distinguishing between interactive and noninteractive data are given in Appendix J.

Decision

A decision is defined as a conscious choice. Three criteria were established for identification of a decision. Firstly the interactive data must contain explicit reference to two or more alternatives. Secondly there must be evidence that the teacher made a selection and became committed to one of the alternatives. Thirdly there must be evidence that the teacher followed through in the lesson with his choice of alternative. The evidence for this last criterion could be located either in the verbal protocols or the videotape record of the lesson.

Basically two classes of decision were distinguished. A Type A decision was one in which all the alternatives considered by the teacher would have resulted in a change of activity or direction in the lesson. A decision in which a choice was made between allowing the lesson activity to proceed without intervention, and some other alternative, was referred to as a Type-B decision.

It was found that generally teachers considered only two alternatives. When three or more alternatives were considered by the teacher, or if the teacher considered a sequel or an extension to an alternative, the decision was then labelled as a modified Type A or B decision.

Forfeit Decision

The term *forfeit decision* has several connotations (Farr & Brown, 1971; Shavelson, 1976). In this study a *forfeit decision* was said to have occurred if the teacher

(1) reported perceiving the need for making a decision but let the opportunity for doing so pass;

or, (2) considered two or more alternatives but made no commitment to either one;

or, (3) made a conscious choice among alternatives but then, subsequently, abandoned the choice without reporting making any other determination.

Deliberate Act

On many occasions teachers saw the need for some action or response but considered only one course of action. No alternative was reported in the interview. If the verbal protocols contained evidence that the teacher thought about a single course of action and proceeded to implement it, this situation was referred to as a *deliberate act*. In effect many deliberate acts could quite conceivably have been decisions if the teacher had not failed to mention the fact that he was considering an alternative.

A deliberate act may also be represented in the data in another way. Teachers often reported that they took a certain course of action and then stated the reason that they consciously thought about at the time for doing so. However, if it could not be clearly established that the thought (reason or purpose) did not precede the act then the term *deliberate act* was not applied.

Following Whitfield (1974b), the term *node* was used to refer to the point in the lesson at which the decision or deliberate act occurred.

Impulsive Act

An instance when the teacher did or said something without knowing why he did so was referred to as an *impulsive act*. Inability to recall his reasons for acting as he did does not consitute sufficient reason for labelling the act an impulsive one, nor does absence in the protocols of any reference to reasons.

Proactive Teaching

As defined by Brophy and Good (1974), *proactive teaching* occurs when the teacher's interpersonal interaction with students reflects deliberate planning and control. The proactive teacher does not merely respond passively to differences in students but actively seeks to compensate for differences and discriminate in favour of disadvantaged students. It is in this sense that the term is used in this study.

Field Detachment Phenomenon

Field detachment has been described by Kagan et al (1967) as a process of *tuning out* whatever is happening at that time and focusing momentarily on a single aspect of classroom life. The teacher apparently detaches himself cognitively from the whole field of classroom operations and concentrates intensely on one aspect of it. Awareness of, or sensitivity to, what is happening elsewhere outside this focus diminishes and becomes vague and shadowy while one theme is predominant in the teacher's mind. The best analogy to this cognitive phenomenon that can be given is theatrical spotlighting.

Cognitive Linking

The stimulated recall protocols contained teacher reports of thoughts during the lesson about past and future lessons and events, some of them quite remote in time. These references were to such matters as lesson content and student competencies, achievements, attitudes, and behavior styles. This referral to past and future lessons by teachers occasionally shaped their on-the-spot teaching behavior and has been called *cognitive linking*.

Externality and *Internality*

These are terms used to describe the loci of causality attributed by teachers to classroom events. In the stimulated recall protocols, *externality* is coded when a teacher attributes success, blame, or failure for a certain event, state, or behavior to forces, conditions, or persons outside himself and his own sphere of influence. *Internality* is described in opposite terms, that is, when a teacher attributes to himself success, blame, or failure for classroom events and student states.

The following phenomena were identified in both the interactive and noninteractive segments of teachers' verbal reports.

Principle

A *principle* has been defined as a maxim, working hypothesis, or fundamental law that a teacher consciously holds and which exercises a directing influence on his classroom behavior.

Belief

Statements by teachers about characteristics of humans and human behavior, particularly those related to school children which they assume to be true, have been termed *beliefs*. In some instances these beliefs may constitute part of the body of conventional wisdom in which principles may have their genesis.

Rule

Rules are guides for student conduct or action in the classroom. They may have been prescribed or suggested by the teacher, or jointly formulated by teacher and students.

Case History

The stimulated recall protocols contain examples of statements, or sets of statements, by teachers about students with whom they have been interacting in the classroom. These portions of the interview data are sometimes lengthy, extend well beyond the interactive thoughts of teachers, and constitute the mental inventories of facts, opinions, beliefs, attitudes, expectations and such like that they hold in respect of individual students. These mental inventories have been called *case histories*.

Accurate and *Inaccurate Recall*

Teachers, while revealing interactive thoughts about one point in a lesson, often relate their discussion to subsequent events in the lesson which they had not then viewed on videotape. The accuracy or inaccuracy of their recall about events still to appear on videotape could usually be ascertained from the videotape. A record of instances of *accurate recall* and *inaccurate recall* by teachers was kept.

Analysis of Preinstructional Interview Protocols

The transcripts of the two preinstructional interviews conducted with each of the six teachers were analyzed to identify details of lesson plans. The details were placed into five categories according to whether they dealt with—

1. goals and purposes of the lesson;
2. content to be covered in the lesson and/or the activities incorporating content in which students were to be engaged;
3. teaching strategies;
4. organizational matters such as number and size of groups, location, use of space, seating arrangements, and distribution and collection of materials;
5. materials and other resources used in the lesson.

Procedures Adopted in the Use of Analytical Techniques

The stimulated recall protocols consist of discrete sections of dialogue between teacher and interviewer, called *segments*. The boundaries of these segments are marked by periods of silence during which the teacher and interviewer were silently viewing the videotape. A segment begins when discussion on some aspect of the lesson was initiated and ends when discussion of that point was terminated. A segment thus comprises all the dialogue between interviewer and teacher about one point on the videotape.

The dialogue in each segment consists of statements by the teacher and interviewer to each other. These unbroken bits of discourse by each participant in the interviews were called *exchanges*.

Analysis of the stimulated recall protocols proceeded on a segment-by-segment basis. All of the following information about one segment was recorded before proceeding to the next segment:

1. number of each segment—first, second, third, etc.;
2. initiator of the segment—interviewer or teacher;
3. total number of exchanges in the segment;
4. number of exchanges spoken by the teacher and the number spoken by the interviewer;
5. number of lines of transcript; also the number of lines spoken by the teacher and the number spoken by the interviewer.
6. the stimulus in the lesson which provoked the discussion, but only if the segment was initiated by the teacher.

Where possible, the stimulus was described employing terms from the low inference classroom observation system which was used to live-code the lesson; this description could be obtained from observers' coding sheets.

7. interactive thought units were identified and categorized;
8. phenomena were also identified and the following details recorded if they occurred:
    - decisions—type, node, number of alternatives, and the factors influencing choice of alternatives;
    - deliberate acts—node, factors considered when planning the course of action;
    - principles, beliefs, and rules—number, and the descriptions of each given by teachers;
    - all other phenomena—frequency with which each occurred;
9. notes about other features of the segment were taken.

The protocols from each interview were analyzed in this segment-by-segment fashion. Where appropriate, the frequencies of occurrence of each item for each lesson were obtained.

Chapter V

PRESENTATION OF DATA

Overview

This chapter consists of six sections. In the first five sections data have been presented, each set accompanied by a brief, non-evaluative (for the most part) description of significant features in the data.

The chapter has been organized to provide, firstly, an account of the teachers in the study and, secondly, details of their interactive thoughts which represent the core of the data in this investigation. Following this, data which will allow a fuller interpretation of the interactive thought data have been presented. This includes details of preinstructional plans and classroom processes. Aspects of teacher and interviewer behavior in the stimulated recall interviews are also presented.

A summary of the most significant features in the data is provided in the last section.

Teacher Presage Data

Teacher presage data were collected to determine how teachers in the volunteer sample differed from each other in terms of personalities, belief systems, and attitudes to children.

The intention was to visually scan these data for marked differences among the teachers and then to attempt to establish logical links between presage differences and unusual aspects of teachers' information processing styles. Any hypothetical relationships which may thus be induced could provide useful information for designing a large scale study to investigate such links statistically.

To provide anonymity for teachers in the study, a number code has been used to identify the participants. They have been designated as 1.1, 1.2, 3.1, 3.2, 6.1, and 6.2, the number before the period representing the grade and the number after the period serving to distinguish between one teacher at each of the three grade levels and the other at the same grade level. Thus 1.1 and 1.2 are the two Grade One teachers, 3.1 and 3.2 are the two Grade Three teachers and so on.

Length of Teaching Experience and Sex

Of the six teachers in the volunteer sample, five were female and one was male. Length of teaching experience varied considerably as shown in Table 7.

Table 7

Length of Teaching Experience of Teachers in the Sample

	Teacher					
	1.1	1.2	3.1	3.2	6.1	6.2
Length of teaching experience (in years)	16	11	4	0.2	7	4

Scores on the Sixteen Personality Factor Questionnaire

The six teachers in the study were administered Forms A and B of this personality test. Raw scores were converted to sten scores based on norms for the general adult population published in the supplement to the Test Manual. Sten scores on secondary factors were calculated using procedures outlined in the Test Manual. Higher-order factors were not calculated because the test designers advocated proceeding to the second stratum only in descriptive research (Cattell, Eber, & Tatsuoka, 1970).

For the purposes of this study low sten scores (1 to 3) and high sten scores (8 to 10) have been regarded as constituting evidence of marked differences from the norms of the general adult population. This decision was based on information contained in the Test Manual which indicated that sten scores of 5 or 6 are average, 4 or 7 as slightly deviant, 2, 3, 8, and 9 as strongly deviant, and 1 or 10 as extreme.

Capsule descriptions of low (1 to 3) and high (8 to 10) sten scores, provided in the Manual and included as Appendix K, have been used as the basis of brief descriptions of those factors in which individual teachers obtained scores markedly different from the established norm.

Results on the personality test are shown in Table 8.

Teacher 1.1 obtained high sten scores on Factors A, E, and I and a low sten score on Q_2. The sten score of 10 on Factor A indicates a warmhearted, easygoing personality who is cooperative, attentive to people, and adaptable. This is further evidenced by a

Table 8

Sten Scores of Teachers on Sixteen Personality Factor Questionnaire

Personality Factor		Teacher					
Low Score Direction	High Score Direction	1.1	1.2	3.1	3.2	6.1	6.2
A Reserved	Outgoing	10	7	9	8	2	3
B Less intelligent	More intelligent	5	7	7	5	7	10
C Less stable	More stable	5	6	6	8	5	6
E Humble	Assertive	8	1	6	7	3	9
F Sober	Happy-go-lucky	4	2	9	9	4	4
G Expedient	Conscientious	5	7	2	5	7	2
H Shy	Venturesome	4	5	9	6	2	7
I Tough minded	Tender minded	9	9	7	9	10	7
L Trusting	Suspicious	5	1	5	3	7	5
M Practical	Imaginative	6	4	8	7	5	10
N Forthright	Shrewd	6	10	2	3	8	3
O Placid	Apprehensive	6	6	5	3	7	4
Q_1 Conservative	Experimenting	6	3	10	7	4	8
Q_2 Group dependent	Self-sufficient	3	4	1	3	10	8
Q_3 Undisciplined self conflict	Controlled	5	7	4	7	6	3
Q_4 Relaxed	Tense	6	4	7	3	7	8
Secondary Factor							
Q_I Introversion	Extroversion	7.0	3.5	10.0	8.3	1.2	5.5
Q_{II} Low anxiety	High anxiety	6.9	5.2	5.5	3.0	7.5	5.2
Q_{III} Tenderminded emotionality	Tough poise	3.3	1.0	5.3	4.3	3.8	9.1
Q_{IV} Subduedness	Independence.	6.6	1.4	7.8	7.2	4.8	10.0

high score on Factor I which is also indicative of impatience, fastidiousness, dependence on others for help and attention, and anxiety about self. A low score on the group-dependency versus self-sufficiency scale adds weight to the above assessment. Somewhat incompatible with a high score on Factor A for this teacher is her high score on Factor E which represents an assertive, self-assured, and independent minded personality who tends to be extra-punitive and authoritarian.

The other Grade One teacher, 1.2, has low sten scores on Factors E, F, L, Q_1, and Q_{III} and high sten scores on Factors I and N. Dominant traits in personalities with this profile are tendencies towards mildness, conformity, conservatism, and introspection. A personality with low scores on Factor L also tends to be concerned about other people. Factor N indicates a tendency towards shrewdness (calculating, worldy, penetrating).

Teacher 3.1 has high scores on six factors (A, F, H, M, Q_1, and Q_I) and low scores on three (G, N, and Q_2), many of which are mutually supportive. Personalities with this pattern of high and low sten scores tend to be outgoing, cheerful, sociable, and extroverted (Factors A, F, H, Q_I), frank, enthusiastic, unconventional, imaginative, critical of conventionality, and spontaneous (Factors F, H, M, Q_1, and Q_I), and impulsive and careless about practical matters (Factors F, M).

High sten scores on Factors A, C, F, I, and Q_I and low sten scores on Factors L, N, O, Q_2, Q_4, and Q_{II} were obtained by Teacher 3.2. In this pattern of highs and lows are revealed persistent tendencies towards low anxiety, composure, calmness, and a relaxed state (Factors C, F, O, Q_4, and Q_{II}), towards cheerfulness, warmheartedness, outgoingness, and concern about other people (Factors A, F, L), and towards forthrightness, spontaneity, and enthusiasm (Factors F, Q_1, and N). Other scores show a tendency towards group dependence (Factors I and Q_2), and towards being critical and analytical (Factor Q_1).

Teacher 6.1 obtained high scores on Factors I, N, and Q_2 and low scores on Factors A, E, H, and Q_I. Taking only the brief descriptors for the four low sten scores, *reserved, humble, shy,* and *introverted,* points up the predominant characteristic of a personality with the above scores. Personalities with high scores on Factors I, N, and Q_2 tend to be tender-minded (dependent, sensitive, fastidious, impatient, artistic, and demanding of help and attention), shrewd (calculating, worldly, penetrating), and self-sufficient (resourceful, prefers making own decisions and acting on them, and not dominant in relations with others).

Teacher 6.2 obtained high sten scores on eight factors (B, E, M, Q_1, Q_2, Q_4, Q_{III}, and Q_{IV}) and low sten scores on four factors (A, G, N, and Q_3). Persons with high sten scores on Factors M, Q_1, and Q_{III} tend to be imaginative, analytical, critical, enterprising, and resilient. High scores on Factors E, Q_2, and Q_{IV}, and low scores on N and Q_3, are characteristic of people who are assertive, forthright, independent, authoritarian, and prefer working alone and making their own decisions. Another dimension of personality, comprising tendencies towards expediency, casualness, and not being overly considerate, careful or painstaking, is revealed in this teacher's two low scores on Factors G and Q_3. In addition, a low score on Factor A indicates a reserved, detached, aloof, skeptical personality while a high score on Factor Q_4 distinguishes a personality tending towards fretfulness, impatience, frustration, and restlessness.

For quick reference purposes, the following summary has been provided to indicate the major, though grossly oversimplified, dimensions of personality of each teacher, as revealed by the 16PF. The summary uses the one-word descriptors for those ends of the scales on which an individual teacher's sten score placement indicated strong or extreme differences from norms (sten scores of 1, 2, 3, 8, 9, and 10).

Teacher 1.1:	outgoing, assertive, tender-minded, group-dependent.
Teacher 1.2:	humble, sober, tender-minded, trusting, shrewd, conservative, tender-minded emotionality.
Teacher 3.1:	outgoing, happy-go-lucky, expedient, venturesome, imaginative, forthright, experimenting, group-dependent, extraverted.
Teacher 3.2:	outgoing, more stable, happy-go-lucky, tender-minded, trusting, forthright, placid, group-dependent, relaxed, extraverted, low-anxious.
Teacher 6.1:	reserved, humble, shy, tender-minded, shrewd, self-sufficient, introverted.
Teacher 6.2:	reserved, more intelligent, assertive, expedient,

imaginative, forthright, experimenting, self-sufficient, undisciplined self-conflict, tense, tough poise, independent.

Attitudes

The Minnesota Teacher Attitude Inventory was scored using the official scoring keys purchased with the test. Raw scores were then converted to percentile ranks using conversion tables based on norms for experienced teachers in school systems with 21 or more teachers and having four years training. The norms are published in the test manual (Cook, Leeds, & Callis, 1951).

Results for all six teachers, as shown in Table 9, were close to, or above, the upper quartile rank. The M.T.A.I. differentiated little difference among teachers in terms of their attitudes to children.

Table 9

Percentile Ranks of Teachers on the Minnesota Teacher Attitude Inventory

	Teacher					
	1.1	1.2	3.1	3.2	6.1	6.2
Percentile rank	73	86	76	74	74	88

Belief Systems

The This I Believe test of belief systems is a projective test and must therefore be scored by trained personnel. The completed test forms were forwarded to the test designer, O. J. Harvey, and were scored under his supervision.

Subjects are assigned to one of four belief systems (Systems 1, 2, 3, or 4) ranging along a continuum from most concrete (System 1) to most abstract (System 4). Where test responses vary across systems so that no one system designation seems appropriate, this is indicated by listing the most prevalent system first followed by a dash, and then the system to which most other responses belong. For example, 1-4 indicates the test subject is categorized as having a predominantly System 1 belief orientation with traces of System 4.

In addition, test responses are scored on seven auxiliary belief dimensions which are related to the belief systems. A five-point scale is used to score test responses, one indicating a low score and five a high score on each dimension. Descriptions of the four belief systems and seven auxiliary dimensions are provided in Appendixes C and D respectively.

Results of this test, presented in Table 10, show that five of the six teachers, Teachers 1.1, 1.2, 3.2, 6.1, and 6.2 have belief systems which are predominantly concrete. Their belief systems have been categorized as System 1 but with traces of other belief systems. This concreteness is manifested in severals ways. Compared with individuals with more abstract belief systems they—

1. have a simpler, less differentiated cognitive structure;
2. show a greater tendency towards making polarized evaluations;
3. are much more dependent on authorities for guides to what they should believe and do;

Table 10

Teachers' Scores on This I Believe Test

	Teacher					
Measure	1.1	1.2	3.1	3.2	6.1	6.2
Belief System	1-4	1-4	4-3	1-4	1-2	1-3
Auxiliary Dimension						
Openness	3	3	4	3	2	2
Candor (low defensiveness)	3	3	5	4	3	3
Evaluativeness	3	3	1	3	4	3
Externality	3	2	1	1	2	1
Cynicism	1	1	1	1	3	2
Optimism	3	3	3	3	2	2
Complexity	3	3	4	3.5	3	3

4. are more intolerant of ambiguity and show a greater need for cognitive consistency;
5. are less able to change set, and respond to complex problems in more stereotyped or less creative ways;
6. have a smaller repertoire of heuristics and methods for problem solving;
7. have less ability to think in terms of hypothetical situations;
8. hold opinions with greater conviction and appear more certain about the durability of those opinions.

Of these five teachers, Teachers 1.1, 1.2, and 3.2 had traces of System 4 and Teachers 6.1 and 6.2 had traces of Systems 2 and 3 respectively. At the other end of the continuum was Teacher 3.1 who was categorized as being predominantly System 4 with traces of System 3. Accordingly, Teacher 3.1 could be described as being at the other end of the continua represented by the above statements. Scores of teachers on the auxiliary dimensions generally reflected their relative positions on the concrete to abstract continuum. Briefly, the auxiliary dimensions are—

openness (willingness to entertain and possibly accept ideas contrary to one's own central ideas);

candor (forthrightness with which a response is made);

evaluativeness (tendency to make good-bad, right-wrong judgments);

externality (attribution of success, failure, or control of one's actions to forces over which one has little control);

cynicism (tendency to express nihilism and to ascribe worthlessness to everything in general);
optimism (feeling of well-being and that everything will turn, or has already turned out, well);
complexity (profundity or depth of thought).

Stimulated Recall Data

Interactive Thoughts

The transcripts of the stimulated recall interviews conducted with each of the six teachers were analyzed using SATIT, a content analysis system developed to categorize the interactive thoughts of teachers, that is the thoughts they had during classroom instruction. The system allowed placement of thoughts into 11 discrete categories:

Perceptions—thoughts in which the teacher reports a sensory experience, what he saw, heard, etc.

Interpretations—thoughts in which the teacher attaches meaning to what he has seen, heard, etc.

Prospective Tactical Deliberations—thoughts in which the teacher considers what course of action he will take next in the lesson.

Retrospective Tactical Deliberations—thoughts in which the teacher is considering, evaluating what he has already done in the lesson.

Reflections—thoughts in which the teacher is considering other past events in, or aspects of, the lesson.

Anticipations—thoughts about what might happen in future phases of the lesson.

Information—Pupil—knowledge, beliefs, opinions, etc. about pupils which the teacher brings to the lesson.

Information—Other—knowledge, beliefs, etc. about all other lesson-relevant matters which the teacher brings to the lesson.

Goal Statements—thoughts about student objectives in the lesson.

Fantasies—units in which the teacher expresses fanciful, bizarre thoughts.

Feelings—units in which the teacher expresses an emotion.

All protocols were analyzed and coded by the investigator. Intracoder and intercoder reliabilities were reported in Chapter IV. All audiotaped interviews were fully transcribed and there were no recording failures or instances of inaudible recording. Some interview segments were not coded, the number being less than 1% of the total. The segments not coded comprised (i) several single-exchange segments where the teacher described what he was doing, named a student, or made an aside about a matter not related to the interview; (ii) segments which were incomplete because the tape ran out just before the speaker concluded; and (iii) segments in which the teacher and interviewer were discussing their roles in the interview. Once the categorization of interactive thoughts was complete, the number of thought units in each of the eleven categories for each lesson was expressed as a percentage of the total number of thought units identified in that lesson. The results of this analysis are shown in

Table 11.

The majority of thoughts reported by teachers were usually perceptions, interpretations, prospective tactical deliberations, reflections, and anticipations. Other categories often containing 5-10% of the thoughts reported in each lesson were information—pupil, information—other, and feeling. Relatively few thoughts in the remaining three categories of tactical deliberation retrospective, goal statement, and fantasy were identified in the protocols.

One point should be noted. Representing the occurrence of teacher feelings in lessons as frequencies is probably unsatisfactory. Other kinds of thoughts are usually ephemeral. They probably come and go with great rapidity, enduring only fleetingly in the consciousness of the teacher. Mention of an emotion often indicated a pervasive condition in the teacher so probably much less importance should be attached to the frequency of feelings than frequencies in any other thought category.

The interactive thoughts in six categories were further analyzed according to substantive components or what the thoughts were about. Four of the five categories which were not subjected to this more intensive examination had the lowest frequencies of occurrence. The fifth category, prospective tactical deliberations, was not included because of the focus in another part of the study on interactive decisions and deliberate acts which constituted an analysis of the interactive thoughts in this category.

Table 11

Percentage Distributions of Individual Teacher's Thoughts over SATIT Categories for Each Lesson

SATIT Thought Category	Teacher 1.1 Lesson 1 Lang Arts %	1.1 Lesson 2 Math %	1.2 Lesson 1 Lang Arts %	1.2 Lesson 2 Math %	3.1 Lesson 1 Lang Arts %	3.1 Lesson 2 Math %	3.2 Lesson 1 Lang Arts %	3.2 Lesson 2 Math %	6.1 Lesson 1 Lang Arts %	6.1 Lesson 2 Lang Arts %	6.2 Lesson 1 Lang Arts %	6.2 Lesson 2 Lang Arts %
N[a]	346	171	279	260	240	321	295	355	148	78	154	211
Perception	18.8	18.1	28.3	26.2	13.8	10.9	19.7	19.7	4.7	9.0	8.4	9.5
Interpretation	9.0	12.3	8.6	10.0	18.3	9.7	23.7	12.7	12.8	5.1	11.0	10.0
Tact. Delib. Prospective	19.4	23.4	16.8	27.3	12.9	20.2	14.9	18.3	20.9	21.8	24.7	23.2
Tact. Delib. Retrospective	0.6	2.3	1.1	2.3	2.5	6.9	2.7	2.8	5.4	2.6	4.5	4.7
Reflection	22.0	17.5	21.1	7.7	15.8	16.8	13.9	23.1	23.0	24.4	20.1	20.4
Anticipation	9.2	7.0	8.2	13.5	12.9	7.2	6.4	8.5	6.8	9.0	7.1	8.1
Information—Pupil	4.9	11.1	4.7	3.8	5.8	10.0	8.8	7.9	12.2	3.8	5.8	2.8
Information—Other	6.6	2.3	6.1	4.6	2.9	9.0	2.7	3.4	4.7	11.5	9.1	10.9
Goal Statement	0.9	2.3	2.5	1.5	6.3	0.3	4.1	0.8	1.4	2.6	6.5	3.3
Fantasy	0.6	0.6			0.4	0.3						
Feeling	8.1	2.9	2.5	3.1	8.3	8.7	3.1	2.8	8.1	10.3	2.6	7.1
	100.1	99.8	99.9	100.0	99.9	100.0	100.0	100.0	100.0	100.1	99.8	100.0

[a]N represents the total number of interactive thoughts reported in each stimulated recall interview.

Substantive Components of Perceptions

Perceptions, the interactive thoughts in which teachers reported their sensory experiences, were further analyzed in relation to the focus or object of those sensory experiences. The purpose of this more intensive analysis of perceptions was to attempt to identify, in particular, the visual and aural cues to which teachers attended during lessons.

Table 12 shows the percentage distribution of perceptions in each lesson across the various classes of cues. It revealed that teachers generally were aware, primarily, of what students in their classrooms were saying. They also reported frequently an awareness of gross events such as student movement, posture, and position, classroom noise, and student work state. Few perceptions, however, contained references to facial expressions, gestures, or other kinds of subtle cues relating to covert intellectual and affective states of students.

Substantive Components of Interpretations

Thought units in which teachers attributed meaning to, or made inferences about, their perceptions were identified in the protocols. These units, called interpretations, were analyzed to determine what it was that teachers made interpretations about. This analysis (see Table 13) revealed that, in most cases, teachers made inferences, based on their perceptions of students, about—

1. what students were thinking;
2. what students' needs, motives, and desires were;
3. student motivational states; and
4. student feelings.

Table 12

Percentage Distributions of Teachers' Perceptions Categorized According to Substantive Components

Substantive Components of Perceptions	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Lang Arts %	Lang Arts %	Lang Arts %
N[a]	65	31	79	68	33	35	58	70	7	7	13	20
Student verbal behavior (work related questions, answers, comments)	33.8	38.7	62.0	32.4	21.2	31.4	34.5	42.9	42.9	71.4	38.5	55.0
Student nonverbal behavior												
A·Movement, posture, position	18.5	12.9	20.3	33.8	39.4	20.0	34.5	22.9		14.3	30.8	35.0
B·Expressions, glances, laughter	4.6	3.2	3.8	2.9	6.1		10.3	8.6				5.0

[a] Number of perceptions in each lesson.

Table 12 (Continued)

Substantive Components of Perceptions		Teacher											
		1.1		1.2		3.1		3.2		6.1		6.2	
		Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
		Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Lang Arts %	Lang Arts %	Lang Arts %
	N[a]	65	31	79	68	33	35	58	70	7	7	13	20
Student work, work activity (working, not working, written work)		20.0	25.8	2.5	19.1	15.2	14.3	1.7	18.6	42.9	14.3	7.7	
Student physical presence, absence		7.7				3.0	2.9		1.4				
Classroom noise (pupil talk, ambient talk)		10.8	3.2	8.9	7.4	12.1	8.6	15.5	4.3			7.7	

[a] Number of perceptions in each lesson.

Table 12 (Continued)

	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
Substantive Components of Perceptions	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Lang Arts %	Lang Arts %	Lang Arts %
N[a]	65	31	79	68	33	35	58	70	7	7	13	20
Miscellaneous (materials, time, texts, visitors, videotaping, lack of verbal response, teacher gestures)	4.6	16.1	2.5	4.4	3.0	22.9	3.4	1.4	14.3		15.4	5.0
	100.0	99.9	100.0	100.0	100.0	100.1	99.9	100.1	100.1	100.0	100.1	100.0

[a] Number of perceptions in each lesson.

Table 13

Percentage Distributions of Teachers' Interpretations Categorized According to Substantive Components

		Teacher											
		1.1		1.2		3.1		3.2		6.1		6.2	
		Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
Substantive Component of Interpretation		Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Lang Arts %	Lang Arts %	Lang Arts %
	N[a]	31	21	24	26	44	31	70	45	19	4	17	21
Student states of knowledge, thoughts, thought processes		41.9	71.4	54.2	42.3	22.7	48.4	42.9	62.2	31.6	25.0	70.6	81.0
Student desires, motives, needs		9.7	14.3	12.5	23.1	11.4	16.1	5.7	4.4	26.3	25.0	17.6	4.8
Student aspirations, goals		3.2				4.5		2.9					4.8
Student motivation for classroom work		9.7	9.5	16.7	23.1	34.1	16.1	28.6	15.6	21.1	25.0	11.8	4.8
Student feelings		19.4	4.8	16.7	7.7	20.5	6.5	15.7	15.6	15.8	25.0		

[a] Number of interpretations in each lesson.

Table 13 (Continued)

Substantive Component of Interpretation	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Lang Arts %	Lang Arts %	Lang Arts %
N[a]	31	21	24	26	44	31	70	45	19	4	17	21
Student working, not working	6.5			3.8		9.7						4.8
Miscellaneous	9.7				6.8	3.2	4.3	2.2	5.3			
	100.1	100.0	100.1	100.0	100.0	100.0	100.1	100.0	100.1	100.0	100.0	100.2

[a] Number of interpretations in each lesson.

Substantive Components of Reflections

Close to one-fifth of all interactive thoughts reported by each teacher in the protocols were reflections. These were thoughts which teachers had during the lesson about some event which had occurred prior to their thinking about it. Past teacher actions were exempt from this set of events because teachers' thoughts about what they themselves had done were labelled as retroactive tactical deliberations. Reflections typically involved some sort of evaluation by teachers, for example a student response was judged as correct, partly right, satisfactory, and so on.

The majority of teachers' reflections were about students, their comments, questions, and answers, as well as their nonverbal behavior, characteristics, and work products. Table 14 also shows that thoughts about the content and characteristics of lessons and about curriculum material comprised a significant proportion of reflections reported in the interviews. For example, teachers reported thinking that an example to be worked was too difficult or too easy, that the lesson was proceeding too slowly or too quickly, or that the material in use by children was partly inappropriate.

Substantive Components of Anticipations

Stimulated recall protocols contained instances of interactive thoughts in which teachers made forecasts or predictions about such things as what might happen next in the lesson and what might follow as a consequence of certain teacher actions. As well, there were instances where teachers stated their expectations of students, what they thought students would say or do, or how they might react. All

Table 14

Percentage Distributions of Teachers' Reflections Categorized According to Substantive Components

Substantive Component of Reflection	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Lang Arts %	Lang Arts %	Lang Arts %
N[a]	76	30	59	20	38	54	41	82	34	19	31	43
Student verbal behavior (comments, questions, responses)	13.2	20.0	25.4	40.0	7.9	13.0	41.5	13.4	2.9	36.8	41.9	48.8
Other student behaviors, characteristics, work	47.4	46.7	28.8	20.0	34.2	46.3	26.8	69.5	50.0	36.8	22.6	7.0
Lesson content characteristics	26.3	3.3	30.5	10.0	21.1	18.5	19.5	15.9	35.3	21.1	32.3	32.6
Classroom atmosphere, noise	2.6	6.6	1.7	5.0		7.4	4.9		2.9	5.3		2.3

[a] Number of reflections in each lesson.

Table 14 (Continued)

	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
Substantive Compontent of Reflection	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Lang Arts %	Lang Arts %	Lang Arts %
N^a	76	30	59	20	38	54	41	82	34	19	31	43
Curriculum materials, resources	9.2	3.3	6.8	15.0	31.6	9.3	2.4					
Time	1.3	13.3			2.6	1.9	2.4	1.2			3.2	4.7
Miscellaneous		6.6	6.8	10.0	2.6	3.7	2.4		8.8			4.7
	100.0	99.8	100.0	100.0	100.0	100.1	99.9	100.0	99.9	100.0	100.0	100.1

[a] Number of reflections in each lesson.

of these thoughts, including teacher expectations for students, were called anticipations.

The categorization of anticipations according to substantive component, or what they were about, is presented in Table 15.

Teacher expectations of students, how they would react, what they would say or do, whether they would be successful or not, constituted a large proportion of these thoughts for all teachers. The categorization also shows that, on a significant number of occasions, teachers anticipated problems or difficulties in lessons such as a slow down in lesson momentum or a lot of noise from students if certain procedures were followed. In addition, teachers often speculated interactively about the probable occurrence of other events in lessons such as failure to cover all planned content, running out of time, and their own ability or inability to answer questions, handle crises, or get lesson points across clearly.

Substantive Components of Thoughts in the Information—Other Category

The stimulated recall protocols showed that, as teachers guided the course of a lesson and shaped their interactions with students, they used information which they brought to the lesson. This information was of two kinds, information about students and information about a whole range of other items, information—other.

The number of thoughts per lesson in the information—other category was relatively small as shown in Table 16. These thoughts were distributed over a diversity of subcategories which varied from teacher to teacher. Information which the teachers recalled

Table 15

Percentage Distributions of Teachers' Anticipations Categorized According to Substantive Components

	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
Substantive Component of Anticipation	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Lang Arts %	Lang Arts %	Lang Arts %
N[a]	32	12	23	35	31	23	19	30	10	7	11	18
What students might say, do, think, feel	18.8	50.0	65.2	62.9	41.9	21.7	78.9	40.0	60.0	28.6	45.5	52.9
Student success			4.3	2.9		8.7		10.0			27.3	
Student failure, delay, confusion in work related activities	15.6	8.3	13.0	17.1	3.2	21.7	5.3	13.3		14.3		5.9
Students' future needs, wants, interests, etc. (as perceived by teacher)	9.4	8.3		2.9	3.2	4.3		6.6	10.0			5.9

[a] Number of anticipations in each lesson.

Table 15 (Continued)

Substantive Component of Anticipation	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Lang Arts %	Lang Arts %	Lang Arts %
N[a]	32	12	23	35	31	23	19	30	10	7	11	18
Problems likely to arise e.g., disorder, pupil inactivity, delays	21.9			8.6	25.8	4.3	10.5		10.0	28.6		
Other classroom events likely to occur, events that teacher wanted or did not want to occur	31.3	33.3	17.4	5.7	25.8	21.7	5.3	30.0	10.0	28.6	18.2	29.4
Miscellaneous	3.1					17.4			10.0		9.1	5.9
	100.1	99.9	99.9	100.1	99.9	99.8	100.0	99.9	100.0	100.1	100.1	100.0

[a] Number of anticipations in each lesson.

Table 16

Percentage Distributions of Teachers' Use of Information— Other Categorized According to Substantive Components

Substantive Component of Thought (Information—Other)	Teacher 1.1 Lesson 1 Lang Arts %	1.1 Lesson 2 Math %	1.2 Lesson 1 Lang Arts %	1.2 Lesson 2 Math %	3.1 Lesson 1 Lang Arts %	3.1 Lesson 2 Math %	3.2 Lesson 1 Lang Arts %	3.2 Lesson 2 Math %	6.1 Lesson 1 Lang Arts %	6.1 Lesson 2 Lang Arts %	6.2 Lesson 1 Lang Arts %	6.2 Lesson 2 Lang Arts %
N[a]	23	4	17	12	7	29	8	12	7	9	14	23
Curriculum content			11.8	16.7	42.9	3.4	12.5	16.7				30.4
Lesson plans	21.7	50.0	41.2			6.9	12.5	8.3		22.2	14.3	8.7
Curric. experiences	26.1		17.6	50.0		41.4	12.5		28.6		28.6	
Extra-curr. experiences						6.9	12.5	25.0				4.3
General knowledge			17.6		14.3		12.5	8.3			7.1	30.4
Knowledge about school, comm.						6.9						
Classroom resources	4.3		5.9	8.3	28.6	10.3		8.3				
Teaching principles, style	8.7	50.0		8.3	14.3	13.8	25.0	16.7	42.9	22.2	42.9	13.0
Beliefs about children	39.1		5.9	8.3		3.4	12.5	8.3		33.3	7.1	4.3
Miscellaneous				8.3		6.9		8.3	28.6	22.2		8.7
	99.9	100.0	100.0	100.0	100.1	99.9	100.0	99.9	100.1	99.9	100.0	99.8

[a] Number of thoughts in Information—Other category in each lesson.

interactively and used during the lesson included beliefs about children, principles of teaching, past curriculum experiences, lesson plans, and curriculum content, however not all teachers used information from all of these subcategories.

Feelings

Thought units in which teachers declared the emotions they were experiencing interactively were categorized as feelings. Examination of each of these units showed that teachers used a large number of words (at least 40) to convey the type of affect they experienced during instruction. A full listing of these affect words, the events which triggered the emotions they represent, and the frequencies with which each occurred are provided in Appendix L. The words actually used by the teachers have been retained where possible.

In Table 17 the emotions described by teachers have been grouped on the basis of assumed similarities and percentage frequencies calculated for each cluster on a lesson-by-lesson basis.

The data in this table show that the emotions which were predominant in the verbal reports of most teachers were contained in the first four clusters. These were the emotions stated below or emotions akin to them—

1. anxiety and tension;
2. frustration, anger, and annoyance;
3. pleasure;
4. surprise and incredulity.

Other emotions registered by some teachers, such as guilt feelings by

Table 17

Percentage Distributions of Teachers' Feelings Clustered According to Similarities

Feelings, Clusters of Feelings	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Lang Arts %	Lang Arts %	Lang Arts %
N[a]	28	5	7	8	20	28	9	10	12	8	4	15
Anxiety, concern, distress, panic, tension, despair, perturbation	14.3	20.0		12.5	15.0	14.3	11.1	20.0		12.5		
Frustration, impatience, anger, disappointment, annoyance, dejection, dissatisfaction, displeasure, irritability, exasperation	32.1	20.0	42.9	25.0	10.0	39.3	44.4	30.0	33.3		50.0	40.0
Pleasure, delight	10.7	20.0	42.9	37.5	40.0	3.6		10.0	25.0	50.0	25.0	13.3

[a] Number of occasions teachers reported feelings in each lesson.

Table 17 (Continued)

Feelings, Clusters of Feelings	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Lang Arts %	Lang Arts %	Lang Arts %
N[a]	28	5	7	8	20	28	9	10	12	8	4	15
Surprise, incredulity, amazement, dismay, puzzlement	17.9	20.0		12.5	15.0	3.6	44.4	40.0		12.5	25.0	26.7
Equanimity, tolerance	3.6		14.3		5.0							
Feelings of 'disorganization'						10.7						
Guilt, defensiveness, apprehension	3.6					21.4			8.3			
Sympathy, pity, regret	7.1	20.0		12.5					25.0	12.5		
Humour, amusement	10.7					3.6						
Listlessness, boredom, tiredness						3.6			8.3			13.3

[a] Number of occasions teachers reported feelings in each lesson.

Table 17 (Continued)

Feelings, Clusters of Feelings	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Lang Arts %	Lang Arts %	Lang Arts %
N[a]	28	5	7	8	20	28	9	10	12	8	4	15
Relief, relaxation					10.0					12.5		6.7
Foolishness					5.0							
	100.0	100.0	100.1	100.0	100.0	100.1	99.9	100.0	99.9	100.0	100.0	100.0

[a] Number of occasions teachers reported feelings in each lesson.

Teacher 3.1 and feelings of sympathy, regret, or pity for students by Teachers 1.1 and 6.1, represented a considerable proportion of the emotions they recorded in their interviews.

Teachers 3.1 and 6.1 reported more feelings than other teachers though Teacher 1.1 also reported, in the first lesson, as high a percentage of feelings as did Teachers 3.1 and 6.1.

Feelings of anxiety, tensions, frustration, and other feelings akin to these were aroused by disruptions to implementation of the lesson plan or by undesirable student behaviors, such as noise, distracting behavior, and inattentiveness which threatened to disrupt the lesson. Student success, good or unusual responses, and conforming or socially desirable behaviors gave rise in teachers to a feeling of pleasure. Student failure to fulfil teachers' expectations provoked feelings of surprise and incredulity.

Phenomena

At the same time as interactive thoughts were coded from the stimulated recall protocols, the verbal reports were examined for the occurrence of phenomena, defined in Chapter IV. As these were identified their occurrence in each lesson was recorded.

Table 18 shows the frequencies of occurrence of each phenomenon in each of the twelve lessons. The major points to be noted are:

1. Usually, fewer than 10 decisions of both types (A and B) were identified in the interview data for each lesson. Choosing a course of action from two or more alternatives was reported infrequently by teachers. The incidence of forfeit decisions (foregoing the opportunity to make or

Table 18

Frequencies with which Phenomena Occurred in the Stimulated Recall Protocols of Individual Teachers

	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
Phenomena	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Lang Arts	Lang Arts	Lang Arts
Decision (Type A)*	4	3	4	6	11	4	3	7	4	1	3	3
Decision (Type B)*	5	2	2	2		3	6	2	4	3		
Forfeit decision*		1	1			2		2	1			1
Deliberate act*	22	22	28	30	19	12	34	24	6	2	29	30
Impulsive act*	2		2		1	2	2	1	2	1	1	4
Proactive teaching*	5	4	9	4		2		1			2	
Cognitive linking*	5		5	1	1	2	1	1	1	1	2	3
Field detachment*	2				2	4		2				1
Externality*	1		1				2		1			
Internality*	2				1		2		1			
Principle	9	19	12	4	2	9	6	10	6	4	9	19
Rule	5	4	2	2		1	1	2	2		4	1
Belief	6	14	2		1		6	1	3	4	1	5
Case history	6	8	4		1	4	2	12	2	1		2
Recall— accurate	1		8		3	2				1	1	2
Recall— inaccurate												2

* The asterisk indicates phenomena identified in the interactive portions of the data only.

implement a decision) was also very low.

2. In nearly every second segment for each teacher (a segment is the discussion between teacher and interviewer about one point or incident in the lesson), a deliberate act was identified. A deliberate act is a potential decision point in the lesson, but what the teacher thought there can not be considered as a decision because it did not involve choice. At these points the teachers considered only one course of action. There was little evidence of impulsive action on the part of teachers.
3. The protocols of both Grade 1 teachers contained nearly all of the instances of proactive teaching identified in the verbal data.
4. Cognitive linking, the term applied to instances when teachers interactively recalled content, experiences, or student behavior from past or future lessons, which were relevant to the current lesson, was evidenced by all teachers. The incidence of this phenomenon was usually quite low but its commonality to all teachers might indicate that teachers consciously attempt to link events in one lesson with those in another. Also important is the fact that this recalled information bore some influence on teacher decision making and on how teachers chose to act or respond in some situations (deliberate acts).
5. Few examples of the field detachment phenomenon were found. It occurred mostly in the lessons of teachers who felt

some disquiet and expressed some concern about their lessons not running smoothly.

6. Only very occasionally did teachers attribute success or blame for what took place in a lesson, including what a student said or did, to anyone or anything. When they did make such an attribution, they cited, as the causal agent, other persons, or forces outside themselves, almost as often as they cited themselves.

7. As teachers recalled their interactive thoughts, they reported teaching principles, classroom rules, beliefs, and inventories of facts, beliefs, opinions, etc. held about students. The interactive thoughts often merged with the noninteractive and, with considerable spontaneity, teachers disclosed additional information and other examples of these phenomena. All of these instances were recorded. Appendix M contains a full list of all the rules, beliefs, and principles disclosed by each teacher. The lists do not distinguish the interactive from the noninteractive.

8. Where accuracy of teacher recall could be confirmed from the videotape this was done. As Table 18 shows there were 18 instances when teacher recall was accurate and 2 when it was inaccurate. On these two occasions the teacher expressed some doubt about the accuracy of recall.

Interactive Decisions

Several aspects of interactive decision making by the six teachers were examined in more detail, namely, type of decision (whether A or B), number of alternatives considered, the factors considered by teachers in making decisions, and the points in the lesson at which these decisions occurred.

Table 19 shows that—

1. Fewer than ten decisions were reported in most lessons, Teacher 6.2 reporting noticeably fewer than the others.
2. The majority of decisions were of Type A. (Both alternatives in a Type A decision represent a change from what is currently happening in the lesson whereas, in a Type B decision, one of the alternatives considered by the teacher is retention of the status quo.)
3. As indicated by the small number of modified Type A or Type B decisions, there were few instances when teachers considered more than two alternatives or extended alternatives. (An extended alternative is one when the teacher considers an alternative and the sequel or sequels to it.)

The factors considered by teachers when selecting an alternative are shown in Table 20. Teachers usually took two or three points into account when reaching a choice as to which alternative to follow. Interpretations, prospective tactical deliberations, reflections, anticipations, and information on pupils figured most prominently in these deliberations.

Table 19

Number of Interactive Decisions Made by Individual Teachers in Each Lesson

	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
Interactive Decisions	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Lang Arts	Lang Arts	Lang Arts
Number of Interactive Decisions	9	5	6	8	11	7	9	9	8	4	3	3
Type:												
A	4	1	4	6	11	3	2	6	4	1	1	3
A (Modified)		2				1	1	1			2	
B	3	2	2	1		2	5	1	4	3		
B (Modified)	2			1		1	1	1				
Total No. of Alternatives Considered	18	10	12	16	22	15	20	18	16	8	6	6
Average No. of Alternatives Considered per Decision	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.0	2.0	2.0	2.0	2.0

Table 20

Factors Considered by Teachers in Interactive Decision Making

	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
Factors	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Lang Arts	Lang Arts	Lang Arts
Perception			1	1			1	1				
Interpretation	2	5	1	1	3		4	1	7			
Tact. deliberation (prospective)	4	3	2		3	3	2	5	4	4	2	2
Tact. deliberation (retrospective)						1			1		1	
Reflection	5	2	4		2	4	2	3	4	1	2	
Anticipation	6	2	1	6	9	3	8	7	3	2	1	2
Information—Pupil	2	4	1	1	3	4	2	1	1			
Information—Other	1		1		1	1	3	1	1	1	2	2
Goal statement			2									
Fantasy												
Feeling	1				2	2			1			
Total no. of factors	21	16	13	9	23	18	22	19	22	8	8	6
Average no. of factors considered per interactive decision	2.3	3.2	2.2	1.1	2.1	2.6	2.4	2.1	2.8	2.0	2.7	2.0

The points at which teachers made interactive decisions are given in Table 21. Most decisions reported by the teachers were made when—

1. There were indications of student unrest, noise, or inattentiveness.
2. Students asked questions, initiated comments, or responded incorrectly or in an unsatisfactory way to questions asked by the teacher.
3. A respondent to a question was needed.

Deliberate Acts

Analysis of the deliberate acts identified in the protocols was taken further in terms of (i) factors considered when planning the course of action, and (ii) the nodes or points at which deliberate acts were reported.

Usually only one or two factors were considered by teachers when a deliberate act was contemplated. These factors, as shown in Table 22, were comprised of thoughts from all but one of the categories of SATIT, the content analysis system.

The nodes for deliberate acts were distributed over 24 categories of points (see Table 23) though most deliberate acts occurred at points in the lesson similar to those at which teachers made decisions. Nodes with high frequencies were—

1. Occasions when the teacher was selecting a respondent to a question, a participant in an activity, or a student to help.
2. Occasions when a specific teaching technique was seen as

Table 21

Frequencies with which Interactive Decisions, Classified According to Node, were Reported by Individual Teachers

	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Lang Arts	Lang Arts	Lang Arts
Node	N^a 9	5	6	8	11	7	9	9	8	4	3	3
Student deviance, noise, restlessness, disruption	2		1	1	5	1	2			2		
Student inattentiveness		1		1								
Teacher anticipation of problem, difficulty	1		1									
Student work complete, incomplete, slow	3			2								
Transition point from one activity to another					2	2			3			

[a] The number of interactive decisions made in each lesson.

Table 21 (Continued)

		Teacher											
		1.1		1.2		3.1		3.2		6.1		6.2	
		Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
		Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Lang Arts	Lang Arts	Lang Arts
Node	N[a]	9	5	6	8	11	7	9	9	8	4	3	3
Child created contact, attempted contact		1	2	1	1		1		1	1			
Student initiated question, comment				1	2	2	1	1		1			
Student response or work incorrect, unsatisfactory, delayed				2		1		3	2	3		1	
Student lack of understanding			1						1				1
Choice of respondent, participant, student to be helped		1	1					3	2				1

[a] The number of interactive decisions made in each lesson.

Table 21 (Continued)

	Teacher											
		1.1		1.2		3.1		3.2		6.1		6.2
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Lang Arts	Lang Arts	Lang Arts
Node	N[a] 9	5	6	8	11	7	9	9	8	4	3	3
Choice of appropriate technique (test, grouping, questioning, etc.)						2		1		1		1
Insufficient time left in lesson				1				1			2	
Shortage of materials					1			1		1		
Late arrival of aides	1											

[a] The number of interactive decisions made in each lesson.

Table 22

Factors Considered by Teachers in Planning Deliberate Acts

	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Lang Arts	Lang Arts	Lang Arts
Factors N[a]	22	22	28	30	19	12	34	24	6	2	29	30
Perception			3			1	4	2				
Interpretation	4	4	2	7	9	1	9	5			6	6
Tact. deliberation (prospective)	2	3	7	9	2	3	3	1	2		2	1
Tact. deliberation (retrospective)				1	2	1	1					2
Reflection	7	5	7	5	3		8	6	3		12	5
Anticipation	8	2	13	16	4	3	3	5	2		8	6
Information—Pupil	2	5	9	5	1	6	10	2	3		5	1
Information—Other	7	2	6				3	1	1	1	8	6
Goal statement	1	3	1	2	4	1	5	1	2	2	2	3
Fantasy												
Feeling	4	2		1	1	1	3	1	1			2
Total no. of factors	35	26	48	46	26	17	49	24	14	3	43	32
Average no. of factors considered per deliberate response	1.6	1.2	1.7	1.6	1.4	1.4	1.4	1.0	2.3	1.5	1.5	1.1

[a] Number of deliberate acts reported per lesson.

Table 23

Frequencies with which Deliberate Acts, Classified According to Node, were Reported by Individual Teachers

	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Lang Arts	Lang Arts	Lang Arts
Node	N[a] 22	22	28	30	19	12	34	24	6	2	29	30
Selection of respondent, participant	2		3	4			3	4			3	
Selection of students for contact (work-, procedure related) by teacher		7		4		3		1			1	1
Selection of specific teaching technique		2	2	5	1		2	1	1		6	11
Selection of appropriate examples in content	4	1	1	1								

[a] Number of deliberate acts made by teachers in each lesson.

Table 23 (Continued)

	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Lang Arts	Lang Arts	Lang Arts
Node	N[a] 22	22	28	30	19	12	34	24	6	2	29	30
Error, infringement of social rules by teacher					1	1		1				1
Anticipation of organiz. problem, student academic difficulties, needs	1			1	1		1		1		1	
Uncertainty about student state of knowledge						1		1				1
Student work, response—slow, incorrect, unsatisfactory, irrelevant, not forthcoming	5	2	7	3	3		7	4	1		6	9

[a] Number of deliberate acts made by teachers in each lesson.

Table 23 (Continued)

	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Lang Arts	Lang Arts	Lang Arts
Node	N[a] 22	22	28	30	19	12	34	24	6	2	29	30
Student work response—acceptable, good, correct, unusual			3		3		4	1	1		2	2
Student lack of knowledge, understanding				1			1	1			1	1
Student resisting help											2	
Student confused, not following directions		1	1		2		1					
Student initiated comment, question	3		5	3	1		1	1		1	1	1
Child created contact	2	1	2			1		4				1

[a] Number of deliberate acts made by teachers in each lesson.

Table 23 (Continued)

	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Lang Arts	Lang Arts	Lang Arts
Node N^{a}	22	22	28	30	19	12	34	24	6	2	29	30
Student deviance, disruption, restlessness, inappropriate behavior		3	1	5	6	2	8	4			3	1
Student inattentiveness		1	1	2	1	1	1				1	
Classroom noise, sound	1		1			1	3				1	1
Lesson not proceeding smoothly, according to plan						2						
Lesson transition point	2	3	1					1	1	1		
Lesson—point in time close to end									1		1	
Materials shortage		1		1								

[a] Number of deliberate acts made by teachers in each lesson.

Table 23 (Continued)

	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Lang Arts	Lang Arts	Lang Arts
Node	N^a 22	22	28	30	19	12	34	24	6	2	29	30
Materials distribution needed	1											
Resource person, late arrival	1											
Organization—unsatisfactory seating plan							2					

[a] Number of deliberate acts made by teachers in each lesson.

necessary by the teacher.

3. When student responses or work products were of poor quality or not forthcoming at all, or when they were of good or unusual quality.
4. When there were indications of student deviance, student inattentiveness, and high levels of classroom sound.
5. When students initiated questions and comments.

Preinstructional Plans

Transcripts of the preinstructional interviews were analyzed to provide an exhaustive list of features in the plans teachers had made for the 12 lessons used in the stimulated recall interviews. All the lesson plan details divulged by the teachers in the preinstructional interviews were placed in one of five catories suggested, in large measure, by the inherent nature of the lesson plans themselves. These five categories were: (1) goals and purposes to be achieved in the lesson, (2) lesson content and student activities, (3) teaching strategies, or what the teacher intended to do in the lesson to accomplish the goals and purposes, (4) aspects of classroom and lesson organization, and (5) materials and resources.

These details have been set out in their respective categories in table form and are presented in Appendix N, but a summary of the number of details occurring in each category for each lesson is provided in Table 24.

It is not possible to designate the details of lesson plans recorded in Appendix N as preinstructional decisions because the

Table 24

Frequencies with which Lesson Plan Details Appear in Preinstructional Interviews with Teachers

Categories of Details in Lesson Plans	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Math	Lang Arts	Lang Arts	Lang Arts	Lang Arts
Goals, purposes	8	4	8	2	4	1	2		2	1	2	6
Content, activities	7	2	10	4	8	4	3	5	2	5	4	4
Strategies	7	3	6	2	5	4	2	4	8	2	7	7
Organization	5	4	4	6	2	3	6	1			2	3
Materials, resources	4	4	2	3	4	1	1	3			1	2
Total	31	17	30	17	23	13	14	13	12	8	16	22

preinstructional interview was not designed to reveal teachers' planning processes and whether teachers made preactive decisions, that is, conscious choices from alternatives.

Table 24 shows that, in planning the videotaped lessons, teachers usually gave consideration to matters covering all five categories of lesson details. Teacher 6.1 was the only exception. Interviews with this teacher revealed no references to organizational details or materials and resources for either lesson.

Some of the content of the preinstructional interviews could not be categorized because it did not deal specifically with lesson plan details, however these sections of the interviews contained remarks which revealed that the teachers shared a common view about the nature of lesson plans generally. Their remarks contained a recognition that the contexts for which lesson plans were designed were characterized by a degree of uncertainty or unpredictability. Their remarks indicated that the lesson planner had to contend with this ambiguity and that a lesson plan had to possess a certain looseness of structure and flexibility and had to accommodate a range of alternate but indefinable teacher responses. Here is a sample of their remarks.

> "I have a feeling that it will take them until about 9:50" (Teacher 1.2).
>
> "If time permits [I'll] read . . . the story" (Teacher 1.2).
>
> "I don't know just how far we'll get. Students may not be finished their other work. It would be hard to judge" (Teacher 1.1).
>
> "We'll play it by ear . . . [We'll] see how long the kids are tuning into it. I'm just going to read the situation and work from there" (Teacher 3.1).

> "I have no idea how it [the lesson] is going to work out" (Teacher 3.2).
>
> "Hopefully it [the plan] will work out okay. . . . I'll be improvising because I don't know what their response is" (Teacher 6.2).
>
> "[I'll use] anything that comes to mind at that particular time" (Teacher 6.2).

Teacher Process Data

Low Inference Data

The Expanded Brophy-Good Classroom Observation System was used to code classroom events in lessons used for stimulated recall purposes. This was done to enable subsequent categorization of the points in the lesson at which teachers stopped the tape to disclose their interactive thoughts. Also, interviewers, when previewing the videotape prior to conducting the stimulated recall interview, identified a number of preselected points at which they intended to stop the tape if teachers did not. These points had been defined in terms of variables from the low inference classroom observation system.

For purposes associated with other studies in the larger research project, the Expanded Brophy-Good System was used to code classroom events in Language Arts and Mathematics for a further five hours in each of the six classrooms. Coding in each classroom was carried out for the times indicated in Table 25.

The data from both videotaped lessons for each teacher, together with the data from the total period of observation in each classroom on a subject basis, have been provided in Appendix O. A thorough analysis of these data is beyond the scope of this study.

Table 25

Total Time Spent in Each Classroom for Purposes of Low Inference Coding

	Coding Time in Minutes (to Nearest 10)					
	Teacher					
Subject Area	1.1	1.2	3.1	3.2	6.1	6.2
Language Arts	370	380	290	380	360	340
Mathematics	100	80	110	110	--	--

However the data have been presented in Table 26 in a much simplified form to serve as a basis for highlighting some of the broad distinctive features of lessons which might be related to patterns in the interactive data.

Reduction of the data was achieved by combining frequencies in certain key categories. One additional category of information has been included, namely, the number of questions followed by chorused responses in both Grade One classes. This type of question-answer sequence occurred frequently in the Grade One classrooms whereas it was a rare event, or did not occur at all, in Grades Three and Six.

In relation to the complete low inference data, one point will be made. The aggregates for all Language Arts and Mathematics in the 'Totals' columns in Table 26, representing the total number of coded events for roughly equivalent periods of coding, show a decline from Grade One to Grade Six. This pattern becomes clearer if adjustments are made for differences in observation times. This was done by dividing these totals by the corresponding times (see Table 25) to give a measure of the average number of coded events per minute. This information is provided in Table 27 and suggests that the Grade One classes generally were busier places for the teachers concerned than either of the Grade Three classes which, in turn, were busier places for the teachers than either of the Grade Six classrooms. A caveat is in order here because not all classroom events are coded by the Expanded Brophy-Good system. However the system captures such a large slice of classroom life that the conclusion appears reasonable. The individual lesson totals were not used to substantiate or deny

Table 26

Summary of Low Inference Process Data

Teacher		Response Opportunities						Dyadic Teacher-Pupil Contacts								Totals			
		Teacher Afforded				Student Initiated		Child Created			Teacher Afforded								
		Process, Prod, Choice Questions	Self-Reference Questions	Opinion Questions	Questions with Chorused Responses	Questions (Rel & Irrel)	Comments (Rel & Irrel)	Work-Related (Cont & Proc)	Personal	? Coder Uncertain	Work-related (Obs & Brief & Long)	Personal	Procedural (Favor & Manag)	Beh-Related (Praise & NVI & Warning & Crit)	? Coder Uncertain	Lesson 1	Lesson 2	All Lang Arts Lessons	All Math Lessons
1.1	Lesson 1 (Lang Arts)	6			46		6	19	7		25		23	24	3	159			
	Lesson 2 (Math)				1			12	13	1	48		12	20			107		
	All Lang Arts Lessons	75		2	160	5	59	179	62	3	369	16	143	137	5			1215	
	All Math Lessons	9				3	6	34	20	2	179	1	39	49	1				343
1.2	Lesson 1 (Lang Arts)	16	52	7	4	9	36	17	10		8	6	8	7		180			
	Lesson 2 (Math)	38			26	3	10	23	6	1	29	1	17	20			179		
	All Lang Arts Lessons	134	78	23	40	36	144	339	86	8	128	7	81	93	2			1199	
	All Math Lessons	44			26	8	13	64	19	7	44	1	37	29					292
3.1	Lesson 1 (Lang Arts)	26	9			4	22	7	5	1	12		5	24	2	117			
	Lesson 2 (Math)	53	1			1	6	9	6	1	1		15	5			98		
	All Lang Arts Lessons	68	20	T		12	71	154	29	7	191	1	101	100	9			764	
	All Math Lessons	95	22			8	25	48	16	6	18		38	20					296
3.2	Lesson 1 (Lang Arts)	67		20		1	21	9	1	3			7	12		141			
	Lesson 2 (Math)	85				1		14	4	4	16			3	1		128		
	All Lang Arts Lessons	527	1	36		26	66	98	8	24	18		71	94	1			970	
	All Math Lessons	167				3	6	21	7	5	16		111	4	1				341
6.1	Lesson 1 (Lang Arts)	86				10	6	15	3		23	2	14	3		162			
	Lesson 2 (Lang Arts)	10	1	12		6	24	7	4		20	2	6	7			99		
	All Lang Arts Lessons	167	12	23		33	86	112	50	3	127	13	99	33				756	
6.2	Lesson 1 (Lang Arts)	12	2			2		8	1		23	1	15	5		69			
	Lesson 2 (Lang Arts)	28	7	12		1	1	1	2				13	6			71		
	All Lang Arts Lessons	190	30	64		22	55	19	26		49	14	101	45				615	

Table 27

Average Number of Coded Events per Minute in All Language Arts and Maths Lessons

	Average Number of Coded Events per Minute					
	Teacher					
Subject Area	1.1	1.2	3.1	3.2	6.1	6.2
Language Arts	3.3	3.2	2.6	2.6	2.1	1.8
Mathematics	3.4	3.7	2.7	3.1		

this claim since one lesson was regarded as too brief a period in which to gain an impression of the usual tempo of classroom life. However, if time adjustments are made to individual lesson data, the same pattern of decline in the number of coded events per minute emerges.

Description of Lessons

The process data summary in Table 26 reveals a number of distinctive features of lessons which will be listed briefly. These terse descriptions of patterns in lessons have been supplemented with information from preinstructional interview data (see Appendix N), from examination of videotape records of lessons, and teacher comments in stimulated recall interviews. They should be read in conjunction with the summaries of lesson plans in Appendix N.

Teacher 1.1

Lesson 1 • Late arrival of student-aides interfered with implementation of lesson plan.

• The resulting disruption to orchestration of group activities fostered circumstances to which the teacher responded with a comparatively high number of behavior-related dyadic contacts in the warning category.

• Low incidence of student-initiated content-relevant comments and questions.

Lesson 2 • Proceeded as planned.

• Basically a review type lesson with considerable time taken up with administration of a test in basic skills. The review was very brief, one example only being used, and accounts for the almost total absence of academic response opportunities.

• Individual checking by the teacher of student seat work accounts for the high incidence of teacher-afforded work-related contacts.

• The number of coded events was low because the lesson was short and students were engaged in completing a test of basic skills in number work.

Teacher 1.2

Lesson 1 • Proceeded as planned.

• Lesson featured several group discussions involving the teacher which explains the high frequency of student-initiated and teacher-afforded response opportunities.

• Students were work-oriented, resulting in a comparatively few, for Grade One, behavior-related contacts.

Lesson 2 • Proceeded as planned.

• Review of material taught earlier and introduction of new concepts account for the high number of question-answer sequences.

• Practice exercises with the new material when the teacher was checking student work individually occupied the second part of the lesson, hence the high tallies in the dyadic contact categories.

Teacher 3.1

Lesson 1 • Proceeded as planned, but teacher expressed doubt about the wisdom of giving students a choice of which activity to do first because of difficulty of getting class to express their preference.

• Inattentiveness and restlessness caused the teacher some concern and is linked with the comparatively high tally in the behavior-related category.

• Listening activities involving an audiotape took several minutes each time it was used.

• Marking of work was done on a class basis so relatively few dyadic contacts occurred.

Lesson 2 • Proceeded as planned.

• Plan was based on teacher's expectation about work completed by students the previous day when a substitute teacher had the class. Some confusion existed in the teacher's mind about how much work had been completed on the previous day.

• Question-answer sequences to develop basic number skills were the predominant activity.

Teacher 3.2

Lesson 1 • Proceeded as planned.

• High incidence of academic response opportunities is indicative of the teacher's style as shown by the comparatively very large numbers in this category for all Language Arts and Mathematics lessons.

• Student inattentiveness and deviance caused some delays in the lesson.

Lesson 2 • Proceeded as planned.

• Predominance of question-answer sequences as in Lesson 1.

• Individual checking by teacher of student work occurred towards the end of the lesson.

Teacher 6.1

Lesson 1 • Proceeded as planned.

• Interaction featuring numerous question-answer sequences occupied the introductory phase of the lesson.

• Individual seat work by students occurred towards the end of the lesson. During this time the teacher checked work of students.

Lesson 2 • Proceeded as planned.

• Students watched a demonstration and recorded observations for several minutes, accounting for the lower number of coded events than in Lesson 1.

• The demonstration aroused the interest of students who responded to this stimulus with a comparatively high number of student initiated comments.

Teacher 6.2

Lesson 1 • Proceeded as planned.

• Lesson pace was slowed by alternating periods of reading and interaction with the teacher.

- Teacher's questions required lengthy answers from students who had to explain the processes they used.

- The 23 teacher-afforded work-related dyadic contacts occurred while the students were completing a worksheet towards the end of the lesson.

Lesson 2

- Proceeded as planned.

- For most of the lesson the teacher interacted with a group of four students. This accounts for the preponderance of response opportunities in the process data.

- Procedural and behavior-related dyadic contacts occurred in relation to the students in the remaining three groups who were engaged in assigned seat work.

High Inference Ratings

The mean ratings over five separate half-hour periods of observation in Language Arts and Mathematics, spread over the two weeks of process data collection, are given in Table 28. They are not differentiated according to subject area because only one rating was made during a Mathematics lesson.

The ratings for teachers can be interpreted only in terms of absolute meanings of scale points as defined in Appendix B since no teacher norms exist. Measures of inter-rater reliability are high as discussed earlier (see Table 5) so that intragroup comparisons can be made with some degree of confidence.

End-of-day high inference ratings were not included because differences between end-of-day and lesson ratings were very small.

Overall, the scales did not discriminate large differences

Table 28

Mean Ratings of Teachers on High Inference Variables[a,b]

	Mean Ratings						
	Teacher						Overall Mean
Variable	1.1	1.2	3.1	3.2	6.1	6.2	
Withitness	3.7	4.0	3.3	3.0	3.9	3.7	3.6
Overlappingness	3.2	4.3	3.3	2.4	3.9	3.4	3.4
Smoothness	3.7	4.4	3.3	3.1	3.9	3.5	3.7
Momentum	3.7	4.2	3.2	2.8	4.4	3.2	3.6
Clarity	3.9	4.3	3.4	2.9	3.5	3.3	3.6
Persuasiveness	3.7	4.3	3.1	3.1	4.4	3.7	3.7
Warmth	2.8	3.9	2.9	2.2	3.6	3.8	3.2
Empathy	1.4	2.3	2.5	1.5	1.7	2.0	1.9

[a] End-of-day ratings were not included.

[b] Ratings were given on a five-point scale.

among the six teachers. Teachers differed most in terms of three variables—overlappingness, momentum, and smoothness. In the absence of norms and information on sensitivity of the scales to teacher differences, little meaning can be attached to fractional differences in ratings.

Teacher 3.2 typically received lower ratings on all variables than all other teachers while Teachers 1.2 and 6.1 received higher ratings.

Withitness

All teachers tended to make a few errors when desisting student deviance but no major differences were apparent.

Overlappingness

Teacher 3.2 tended to focus on one issue at a time and to ignore other matters which may have been competing for her attention, whereas all other teachers sometimes attended to two or more matters concurrently. This tendency was most pronounced in Teacher 1.2.

Smoothness

Teachers interfered only occasionally in the ongoing flow of academic events though, once again, this kind of behavior occurred even less frequently in the classroom of Teacher 1.2.

Momentum

Evidence of teachers' dwelling too long on one issue or topic, or dealing with pupils one at a time when it was appropriate to treat them collectively, was slight. These kinds of behaviors were more apparent in the classroom behavior of Teachers 3.1, 3.2, and 6.2 than in the styles of other teachers.

Clarity

Teacher ratings on clarity suggested that teachers gave information, explanations, and responses clearly though there were occasions, most pronounced in Teacher 3.2, when the teachers were vague, unclear, and imprecise.

Persuasiveness

All teachers were able to communicate an average, or higher, degree of persuasiveness. The ability to motivate was considered to be more in evidence in Teacher 6.1 than in others. Teachers 3.1 and 3.2 met with less success than the others in their efforts to motivate students and to get them to do work related to the objectives of the lessons.

Warmth

The rating for Teacher 3.2 was close to two and indicates that, in interaction with students, she usually responded mechanically, passively, and with mild criticism, and conveyed a disinterest in students and an apparent lack of concern for them. Teachers 1.1 and 3.1, with ratings close to 3, were considered neutral in their expression of attitudes to students. Their behavior indicated interest in students but it did not convey a clear expression of warmth, neither was there any significant level of criticism.

Empathy

All ratings on the empathy scale were below three, indicating that teachers' verbal responses to the expressed feelings of students did not mirror the affect and meaning conveyed in the original student expressions. The most empathic teacher of the six was

Teacher 3.1, but even she did not consistently reflect in her own responses to students the affective components in their messages to her. The five remaining teachers varied between not attending to students' feelings, or attending to but misrepresenting them.

Aspects of Stimulated Recall Interviews

Stimulated recall interviews varied in length from 45 to 110 minutes but most were of 60 to 75 minutes duration. During the interview the videotape of the lesson was stopped at points in the lesson when teachers relived events in the lesson and recalled their interactive thoughts about them.

The number of stimulus points in each lesson tended to be in the range of from 40 to 50. As shown in Table 29, there was one exception to this pattern. In the interviews with Teacher 6.1, the number of stimulus points used in each lesson was considerably lower than those for all other teachers.

Table 29 also shows the distribution of stimulus points across successive five-minute periods of each lesson. Lessons tended to vary in length but, generally, stimulus points came from the beginning, middle, and end of each lesson.

Some Aspects of Teacher Behavior in Stimulated Recall Interviews

Stimulus Points in Lessons

The interactive thoughts revealed by teachers in each segment of the interviews were usually about clusters of specific matters; all closely related to each other and associated with some brief incident

Table 29

Distributions across Lessons of Stimulus Points used in the Stimulated Recall Interviews

Teacher	First 5 Min. Period	Second 5 Min. Period	Third 5 Min. Period	Fourth 5 Min. Period	Fifth 5 Min. Period	Sixth 5 Min. Period	Seventh 5 Min. Period	Eighth 5 Min. Period	Ninth 5 min. Period & After	Total No. of Stimulus Points per Lesson
	Number of Points in Successive Five Minute Periods of Lessons									
1.1										
First Interview	17	12	5	19	8	6				67
Second Interview	8	10	15	6	1					40
1.2										
First Interview	9	3	12	2	10	1	7			44
Second Interview	12	13	4	10	6	1	2			48
3.1										
First Interview	11	6	5	7	6	3	0	8	2	48
Second Interview	10	9	4	7	3	2	6			41
3.2										
First Interview	13	7	16	4	3	2	2			47
Second Interview	14	7	4	9	3	2	3	3	8	53
6.1										
First Interview	5	4	4	4	8	2				27
Second Interview	4	2	2	2	2	1				13
6.2										
First Interview	4	16	2	12	15	5				54
Second Interview	5	16	14	8	9	7	0	5		64

in the lesson. These points were chosen by the teacher and also by the interviewer. Teacher-selected points were described, where possible, in terms of variables used in the Expanded Brophy-Good Teacher-Pupil Dyadic Classroom Interaction Observation System. They were then categorized and frequencies in each category obtained and converted to percentage form as shown in Table 30.

This analysis revealed that there were eight major categories of points about which teachers sought to disclose their interactive thoughts. These categories distinguished themselves by being the only ones in respect of which all six teachers (five teachers in one instance) had entries. These categories were (1) private teacher-pupil contacts initiated by the child (child created contacts), (2) private teacher-pupil contacts initiated by the teacher (teacher afforded contacts), (3) situations when the teacher was giving directions to a group or whole class, (4) information giving or imparting knowledge by teachers, (5) a variety of question-answer sequences between students and teacher, (6) public student initiated comments, (7) public student initiated questions, and (8) incidents related to noise, student restlessness, and deviant behavior in the classroom.

The distribution of stimulus points across these major categories for each interview is shown in Table 30. A more detailed classification of these points appears in Appendix P.

The percentages in each category in Table 30 show considerable variations among teachers and also, frequently, from one interview to the next with the same teacher.

Table 30

Percentage Distributions of Teacher-selected Stimulus Points[a] across Major Categories

Category of Teacher-Selected Points in Lessons	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Lang Arts %	Lang Arts %	Lang Arts %
N[b]	54	30	21	26	40	32	37	39	15	5	49	56
Child created contacts	14.8	20.0	4.8	11.5	7.5	6.3	0.0	23.1	26.7	20.0	2.0	5.4
Teacher afforded contacts	14.8	43.3	4.8	26.9	20.0	12.5	8.1	15.4	0.0	0.0	26.5	17.9
Direction giving by teachers	22.2	10.0	4.8	3.8	25.0	15.6	8.1	5.1	6.7	0.0	10.2	5.4
Information giving by teachers	1.9	0.0	0.0	3.8	2.5	6.3	0.0	2.6	6.7	0.0	16.4	10.7
Question-answer sequences	16.7	3.3	23.8	26.9	15.0	15.6	45.9	38.5	0.0	20.0	26.5	48.2
Student initiated comments	9.3	0.0	23.8	0.0	2.5	9.4	2.7	0.0	13.3	20.0	2.0	1.8

[a] Stimulus points—the lesson points about which teachers revealed their interactive thoughts.

[b] Number of teacher-selected points in each stimulated recall interview.

Table 30 (Continued)

Category of Teacher-Selected Points in Lessons	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2	Lesson 1	Lesson 2
	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Math %	Lang Arts %	Lang Arts %	Lang Arts %	Lang Arts %
N[b]	54	30	21	26	40	32	37	39	15	5	49	56
Student Initiated questions	1.9	0.0	9.5	3.8	5.0	3.1	2.7	0.0	6.7	0.0	2.0	1.8
Incidents related to noise, student restlessness, and deviant behavior	3.7	6.7	0.0	3.8	2.5	9.4	18.9	2.6	0.0	20.0	6.1	3.6
Other	14.8	16.7	28.6	19.2	20.0	21.9	13.5	12.8	40.0	20.0	8.2	5.4
	100.1	100.0	100.1	99.7	100.0	100.1	99.9	100.1	100.1	100.0	99.9	100.2

[a] Stimulus points—the lesson points about which teachers revealed their interactive thoughts.
[b] Number of teacher-selected points in each stimulated recall interview.

Other Teacher Response Patterns

It was anticipated that teachers would play the dominant role in the stimulated recall interviews. Teachers were to be encouraged to be the initiators of much of the dialogue and to assume control over the flow of events in the interviews.

The data in Table 31 show that in eight of the twelve interviews teachers were the initiators of over roughly three-quarters of the segments. In the remaining four interviews involving two teachers, 1.2 and 6.1, the percentage of interview segments initiated by these two teachers fell well below the 75% mark achieved by the other teachers.

Table 31 also shows that teachers accounted for slightly more than half the exchanges in most interviews. The unusually high percentage of exchanges by Teacher 6.2 occurred because, in both interviews with this teacher, there were a large number of segments in which the teacher was the only speaker. Further evidence of this can be seen in the data on average number of exchanges per segment. In the interviews with all other teachers there was an average of three or more exchanges between teacher and interviewer per segment but, in the case of Teacher 6.2, the average was below two in one interview and slightly above two in the second interview.

Teachers did most of the talking in the interviews, being responsible for 75% or more of the lines of interview data on transcripts.

Variations in the length of interviews have already been noted but are highlighted by the range of 200 to 1,159 in the number of lines

Table 31

Basic Data on Some Teacher Behavior Patterns in Stimulated Recall Interviews

	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	Interview		Interview		Interview		Interview		Interview		Interview	
Aspects of Verbal Behavior	1	2	1	2	1	2	1	2	1	2	1	2
No. of segments	67	40	44	48	48	41	47	53	27	13	54	64
% initiated by teacher	80.6	75.0	47.7	54.2	83.0	78.0	78.7	73.6	55.5	38.5	90.7	87.5
No. of exchanges	421	221	259	245	143	161	155	238	77	45	99	146
% of exchanges spoken by teacher	55.8	56.6	53.7	53.9	63.6	58.4	61.3	58.4	59.7	53.3	74.7	68.5
No. of exchanges per segment	6.2	5.5	5.9	5.1	3.0	3.9	3.3	4.5	2.9	3.5	1.8	2.3
No. of lines of interview data	1159	783	704	604	436	615	605	734	330	200	552	635
% of lines spoken by teacher	77.7	84.5	79.3	75.2	84.6	85.7	87.9	84.1	83.0	80.0	91.8	86.5
No. of interactive thoughts reported per segment	5.2	4.3	6.3	5.4	5.0	7.8	6.3	6.7	5.5	6.0	2.9	3.3

of typewritten interview data across all teachers.

As shown in Table 31, there appears to be only a slight variation in the average number of interactive thoughts identified in each segment, though once again the statistic on Teacher 6.2, being considerably lower, appears to represent a sizeable deviation from the averages for the other five teachers.

Some Aspects of Interviewer Behavior in Stimulated Recall Interviews

In stimulated recall interviews the role of the interviewer was to facilitate full disclosure by the teacher of his interactive thoughts and feelings. Interviewers were required to create an interview climate in which the teachers would feel free to explore and verbalize their interactive thoughts and in which the teachers would feel they had a large measure of control. Interviewers were expected to be nondirective, to wait for teachers to initiate discussion, to listen attentively to what teachers were saying, and to respond to teacher initiations with questions which invited teachers to extend and clarify the exposition of their interactive thoughts. In many respects they had to behave as an open, accepting counselor would behave.

The data on interviewers' behaviors in stimulated recall interviews, presented in Table 32, are a mirror image of data on teachers' interview behaviors presented in Table 31 and discussed earlier. Where teachers did not assume the role of initiator, interviewers did so. In both interviews with Teacher 1.2, Interviewer 1 assumed the responsibility for initiating the discussion in

Table 32

Basic Data on Some Interviewer Behavior Patterns in Stimulated Recall Interviews

	Interviewer											
	1				2				3			
	with teacher				with teacher				with teacher			
Aspects of Verbal Behavior	1.1		1.2		3.1		3.2		6.1		6.2	
No. of segments	67	40	44	48	48	41	47	53	27	13	54	64
% initiated by interviewer	19.4	25.0	52.3	45.8	17.0	22.0	21.3	26.4	44.5	61.5	9.3	12.5
No. of exchanges	421	221	259	245	143	161	155	238	77	45	99	146
% of exchanges spoken by interviewer	44.2	43.4	46.3	46.1	36.4	41.6	38.7	41.6	40.3	46.7	25.3	31.5
No. of lines of interview data	1159	783	704	604	436	615	605	734	330	200	552	635
% of lines spoken by interviewer	22.3	15.5	20.7	24.8	15.4	14.3	12.1	15.9	17.0	20.0	8.2	13.5

approximately 50% of all segments, whereas it had been as low as approximately 20% in interviews with Teacher 1.1. The same pattern exists in the interviews conducted by Interviewer 3 with Teachers 6.1 and 6.2. In interviews with teacher 6.2, only 9.3% and 12.5% respectively of all segments were initiated by the interviewer but in the case of Teacher 6.1 the percentages were close to 50 in both interviews.

The content of a sample of exchanges spoken by all three interviewers was subjected to analysis. The sample consisted of interviewer-spoken exchanges on every fourth page of the stimulated recall protocols. Sentences in each exchange of the sample were classified according to the scheme shown in Table 33. The data presented in Table 33 show that the verbal behavior of interviewers was comprised mainly of questions. Four kinds of questions, Categories A(i), (ii), (iii), and (iv) (standard, probing, and those requiring confirmation or clarification by teachers of what they had said in the interview), accounted for 75.1%, 71.2%, and 73.2% of sentences in exchanges spoken by Interviewers 1, 2, and 3 respectively.

Other categories carrying large percentages were B(i) (non-evaluative descriptions of lesson aspects) for Interviewers 1 and 2, category A(vi) (questions requiring teachers to recall information held prior to the lesson) for Interviewer 2, and category B(iv) (asides) for Interviewer 3.

Categories of interviewer verbal behavior not reconcilable with the interviewer role definitions are categories A(viii) (leading questions) and B(ii) (evaluative descriptions of lesson aspects).

Table 33

Percentage Distributions of Categories of Interviewer Verbal Behavior in Stimulated Recall Interviews

		Interviewer		
		1	2	3
	N[a]	132	59	71
Categories of Verbal Behavior in Interviewer Exchanges	%[b]	25.6	23.0	57.7
		%	%	%
A. Questions				
(i) Standard question (e.g. "What were you thinking there?" "What were you feeling there?")		13.6	18.7	28.1
(ii) Probing question (e.g. "You said you noticed his expression. What did it mean to you?" "You said you ignored her comment. Can you say why?")		20.4	16.9	14.1
(iii) Question requiring confirmation by teacher of what he had previously said		17.4	8.5	2.8
(iv) Question requiring clarification by teacher of what he had previously said		23.5	27.1	28.2
(v) Question requiring description by teacher of a classroom event, teacher behavior, or student behavior		2.3	1.7	2.8
(vi) Question requiring recall of information by teacher (e.g. "How long have you been dealing with this topic?" "Is she [pupil] always late?")		0.8	10.2	2.8

[a] Number of exchanges in the sample from each interviewer.

[b] Number of exchanges expressed as a percentage of the total number of exchanges spoken by each interviewer.

Table 33 (Continued)

		Interviewer		
		1	2	3
	N[a]	132	59	71
Categories of Verbal Behavior in Interviewer Exchanges	%[b]	25.6	23.0	57.7
		%	%	%
(vii) Question requiring explanation by teacher of some aspect of the lesson		3.8	0.0	0.0
(viii) Leading question (e.g. "Did you think about asking someone else?" "Were you feeling pleased about that?")		0.8	3.4	2.8
B. Statements				
(i) Nonevaluative description of aspect of lesson (e.g. "Now you left that pupil to go to another one." "You worked that example on the board.")		10.6	6.8	2.8
(ii) Evaluative description of aspect of lesson (e.g. "You're looking displeased there." "That part of the lesson went a bit slowly.")		0.0	0.0	2.8
(iii) Direction to teacher (e.g. "Turn the video back." "Look at the expression on his face.")		0.8	1.7	2.8
(iv) Aside (e.g. "The camera missed that." "The videotape picture is not very clear there.")		1.5	3.4	8.5
(v) Restatement of teacher remark		3.0	0.0	0.0
(vi) Answer to teacher's question		1.5	1.7	1.4

[a] Number of exchanges in the sample from each interviewer.

[b] Number of exchanges expressed as a percentage of the total number of exchanges spoken by each interviewer.

The percentages of verbal behavior in these categories for each interviewer are relatively very small, jointly comprising 0.8%, 3.4%, and 5.6% for Interviewers 1, 2, and 3 respectively.

Summary

The most significant points emerging from the analysis of the research data are summarized below:

Teacher Presage Data

1. Length of teaching experience among the six teachers ranged from 0.2 years to 16 years.
2. Teacher 3.1 had a predominantly abstract belief system; all others had belief systems classified as predominantly concrete.
3. All teachers scored above the 75th percentile on the test of attitudes towards children.
4. Teachers obtained sten scores on some scales of the personality tests which differed markedly from population norms. The scales on which these deviant sten scores were obtained varied from teacher to teacher.

Stimulated Recall Data

Interactive Thoughts

1. Ten of the eleven categories of thought units were represented in the protocols of all six teachers. Fantasies were identified in the protocols of only two teachers, Teachers 1.1 and 3.1.

2. The percentages of thought units in each category varied from teacher to teacher and from lesson to lesson with the same teacher. The range in percentages for each category across the 12 lessons is indicated below:

Perceptions	(4.7% - 28.3%)
Interpretations	(5.1% - 23.7%)
Prospective tactical deliberations	(12.9% - 27.3%)
Retrospective tactical deliberations	(0.6% - 6.9%)
Reflections	(7.7% - 24.4%)
Anticipations	(6.4% - 13.5%)
Information—Pupil	(2.8% - 12.2%)
Information—Other	(2.3% - 11.5%)
Goal statements	(0.8% - 6.5%)
Fantasies	(0.3% - 0.6%)
Feelings	(2.5% - 10.3%)

3. Perceptions reported by teachers consisted mainly of student comments, questions, and responses; movements, noise, and student deviance. Occasional references only were made to subtle nonverbal cues such as facial expressions and gestures.

4. Teachers made inferences about what students were thinking and feeling, students' motivational states, and their needs, motives, and desires. There was no evidence that teachers sought to verify their interpretations.

5. Teachers' interactive thoughts consisted of a relatively high percentage of thoughts about what they were going to

do (prospective tactical deliberations) and relatively few about what they had done (retrospective tactical deliberations).

6. Most reflections were about student comments, questions, and answers; written work; noise and students' nonverbal behavior (movement, inattentiveness); content and characteristics of lessons; curriculum materials.
7. Teachers' anticipations were comprised mainly of expectations for students and predictions about lesson difficulties.
8. Information retrieved from memory and used interactively consisted principally of information about students and, to a lesser extent, principles of teaching, past curriculum experiences of students, lesson plans, and curriculum content.
9. Teachers reported a wide variety of emotional states experienced during instruction. Negative feelings of anxiety, frustration, etc., were provoked by lesson plans going awry and student-caused disruptions in lessons (mainly deviance). Student success, good or unusual responses, and conformity to a *good* model of behavior in the classroom gave rise to feelings of pleasure and delight. Teachers expressed surprise and incredulity when students failed to meet the teachers' expectations for them. Only one teacher, Teacher 3.1, hypothesized interactively about the causes of non-fulfilment.

(Findings reported in 3 to 9 above applied generally to all teachers in the sample unless indicated otherwise.)

Phenomena

1. Usually, fewer than 10 decisions were reported per lesson.
2. Decision making involved choice from two alternatives but rarely three or more.
3. Two or three factors were considered when teachers made a choice.
4. The number of deliberate acts (one course of action considered, no alternatives) identified in most protocols ranged from 20 to 30. One or two factors were taken into account when a deliberate act was planned.
5. Decisions and deliberate acts occurred most frequently when there were signs of student unrest, noise, deviance, or inattentiveness; when students initiated questions, comments, or responded incorrectly or in some other unsatisfactory way to a question; when a respondent to a question was needed. Most of the points described above were unpredictable in terms of specific details.
6. Few impulsive acts were identified in any teacher's protocols.
7. Instances of proactive teaching occurred most frequently in the protocols of both Grade One teachers, but only very occasionally in all others.
8. Incidence of other phenomena (forfeit decisions, cognitive linking, externality, internality, field detachment) was low.

9. Certain overarching principles appeared to dominate the thinking of teachers.
10. Few classroom rules were cited by teachers in the interview protocols.

Preinstructional Plans

1. Lesson plan details reported by teachers were: (i) goals, purposes; (ii) content, activities; (iii) teaching strategies; (iv) organization; (v) resources, materials. No details on (iv) and (v) were reported by Teacher 6.1.
2. The number of details reported per lesson ranged from eight to thirty-one.

Process Data

1. Each lesson used in the stimulated recall interviews had several broad distinctive features as shown by the low inference classroom observation systems. (No detailed analysis was undertaken.)
2. The average number of events coded per minute by the Brophy-Good system showed a distinct decline from the Grade One classes through Grade Three to Grade Six.
3. High inference measures discriminated small differences among teachers on most of the eight scales used.

Introspective Methodology

1. Teachers initiated roughly 75% or more of all segments in the interview protocols. Teachers 1.2 and 6.1 initiated 50% of the segments.

2. Teachers were responsible for 75% or more of the number of lines of interview data.
3. Most interviewer talk was in the form of questions. Principal questions asked were standard questions (What were you thinking, feeling at that point in the lesson?), probing questions, and questions requiring teachers to confirm or clarify their reports of interactive thoughts. Instances of inappropriate verbal behavior by interviewers (leading questions, evaluative comments) were very rare.
4. Points at which the videotapes were stopped were distributed over the beginning, middle, and end parts of all lessons.
5. Intercoder reliability measures on the use of the content analysis system were satisfactory (.67 and .73). Estimates of intracoder reliability were high (range: .81 to .89). (Scott's formula was used to estimate reliability.)
6. Teachers tended to stop the videotape to disclose interactive thoughts at the same points. These included: child created contacts, teacher afforded contacts, direction giving by teachers, information giving by teachers, student initiated questions and comments, question-answer sequences, and student deviance, restlessness, or ambient noise.

Chapter VI

DISCUSSION OF RESULTS

Overview

In this research project five sets of research questions were posed. These five sets of problems related to—

1. kinds of information that teachers process during the interactive phase;
2. ways in which information is processed by teachers in the interactive phase;
3. other phenomena which characterize teachers' information processing;
4. potential of introspective methodologies for investigating teachers' cognitive functioning during instruction;
5. prima facie evidence of relationships between variables pertaining to contexts and teacher presage factors on the one hand, and information processing styles of teachers on the other.

The order in which the problems were stated has largely determined the way in which this chapter was organized. However, because of the inter-relatedness of the questions posed in 1, 2, and 3 above, discussion of results pertaining to those topics has been integrated. Thus there are three sections to the chapter, the first dealing with information processed, processes, and other phenomena; the second with the potential value of introspective methodology for investigating interactive cognitive functioning of teachers; and the third with relationships between teacher presage and contextual variables and information processing by teachers.

Information, Processes, and Phenomena

Analysis of the stimulated recall protocols revealed a degree of congruency in the kinds of interactive thoughts reported by all six teachers. Firstly, all categories of thoughts identified by the content analysis system (SATIT), with one exception, were represented in the protocols of all teachers. Secondly, categories with high percentage frequencies and those with low percentage frequencies tended to be the same for all teachers. There were, as Table 11 shows, variations in the percentage frequencies in categories but conformity to a broad pattern was evident. All teachers reported thinking most frequently about the tactics they were going to employ next in the lesson and about what had occurred in the lesson, but gave little thought to what they themselves had done in the lesson or its impact on the class and lesson. All teachers reported retrieval of information about pupils and other lesson relevant topics to about the same extent. Teachers were also very much alike in that their interactive thoughts contained about the same proportions of anticipations, interpretations, and feelings, but few references to goals.

The emergence of this pattern in only two protocols per teacher is interesting, but the extent to which this pattern typifies interactive thinking of the teachers cannot be determined from such a small sample of lessons.

In the more detailed analysis of thoughts and processes, this tendency towards congruency is also apparent and, in some instances, is perhaps even more marked. For example, the substantive components of perceptions and interpretations reported by the six teachers were similar in many respects, the number of interactive decisions and deliberate acts showed consistency across lessons, the same phenomena were identified in all teachers' protocols, and the frequencies of occurrence of many phenomena revealed only small variations.

In the discussion of results, therefore, teachers will be treated as a group where similarities are apparent, and references to individual teachers will be made where teachers diverge markedly from the norms for the group.

Perceptions

It has been proposed that awareness, the extent to which a teacher consciously monitors his own behavior in the classroom as well as other aspects of classroom life, might contribute to teacher effectiveness (Brophy & Good, 1974). Teacher awareness can be conceptualized as having two inter-related dimensions, awareness of students and classroom events, and awareness of self and one's impact on students and lesson events.

The analysis of teachers' interactive thought data in this study showed that teachers consciously monitored student behaviors and other events and features of classroom life. They indicated this by reporting in the interviews principally what they had seen or heard. Such reports were categorized as thought units to which the term *perception* was applied. Thoughts about past teaching behavior, and its impact on students and the lesson, were also identified, though the incidence of this kind of thought was generally much lower. These thought units were called *retroactive tactical deliberations.* At this point perceptions will be dealt with and retroactive tactical deliberations will be discussed later in the chapter.

The extent to which teachers reported perceptions in the stimulated recall interviews varied. For one teacher, perceptions constituted 28% of all reported interactive thoughts, for another, representing the other extreme, the percentage was as low as 5%. This could be accounted for, partly, by procedures adopted in the stimulated recall interviews. Instructions to teachers to report their conscious sensory experiences, what they had seen, heard, etc., as part of their interactive thoughts and feelings were probably not explicit enough. It would seem, then, that differences in reporting perceptions represent not so much a difference in awareness as simply differences in interview behavior—one teacher reported more fully on perceptions than another. Some support for this position is found in the high inference ratings of teachers. Both of the above teachers, representing the two extremes on the perception reporting continuum, were given almost identical ratings on *withitness*. The relationship between withitness and awareness has not been established statistically, but it is conjectured that there probably is a link. If one of the above teachers was less aware than the other to the extent suggested by the differences in percentages of perceptions in interactive thoughts, it would very likely have been reflected in the less aware teacher making significantly more timing, target, and over-reaction errors in desisting undesirable behavior in the classroom, which was not the case.

The interesting point about perceptions of the six teachers is that, despite the variations among teachers in reporting perceptions, teachers reported seeing and hearing much the same sorts of things. As would be expected, they heard student answers to questions and student initiated comments and questions, and they readily picked up movements and sounds which might have been indicative of fractious behavior on the part of students. They attended also to signs indicating that students were working or not working. Many of these could be classed as whole body or gross behaviors by students. They were the kinds of highly visible or audible events which, in a sense, almost invited or signalled the teacher to attend. Very few perceptions focused on discreet or subtle stimuli such as a facial expression, a look, a glance, word emphasis in an answer, or other emotional components of student behavior, verbal or nonverbal.

Now, of course, the teachers may have been cognizant of these signs or cues and did not report them. If they were, then it was not reflected in empathic teacher responses in the classroom because teachers received low ratings on empathy, usually below two on a five-point scale. A rating of two or below meant that (i) teachers did not attend to student feelings, or (ii) attended to them and misrepresented them. Another possibility is that teachers were aware of affective signs but were unable to reflect accurately in their own responses the student feeling and meaning expressed in verbal and nonverbal ways.

Perhaps the lower *visibility* or lower prevalence of the subtle outer signs of inner states accounted for their low representation in perceptions. On the other hand teachers may see and hear them and not attend to them because attending to them is too time-consuming, or because teachers find them difficult to interpret, or because teachers are concerned more with social dimensions of classroom life, as Kounin (1970) suggested, than with student personal, psychological matters. Relationships between teacher awareness of, and responses to, subtle cues of the type mentioned, and student success in the classroom, appear to warrant investigation.

The above generalizations about what student behaviors and cues teachers attend to lend support to findings reported in the research literature that pupil response and participation were the cues that teachers observed most frequently (Clark & Peterson, 1976; Morine & Vallance, 1975).

The best possible guess that the writer can make at this time is that the six teachers did not attend to the finer, subtler, less overt communications or clues that students gave out about their internal states of mind and feeling.

Another point to be noted is that, for each teacher, the percentage of perceptions in interactive thoughts in both lessons remained very stable. The largest between-lesson difference for any teacher was 4.3% for Teacher 6.1. This would appear to indicate that subject differences did not result in any appreciable difference in the extent to which teachers reported perceptions in stimulated recall interviews.

Interpretations

Interpretations are inferences that teachers make about students during instruction and, by definition, are based on the teachers' prior perceptions of those students. For example, a teacher might report seeing a student looking outside the classroom and make the inference that the student is not listening, or is bored.

In Chapter V data were presented showing that, for all six teachers, interpretations comprised usually about 10% of their reported interactive thoughts. Their importance is probably much greater than that suggested by the percentage, because interpretations apparently played an important part in shaping the way a teacher responded to students in a variety of situations and the course of action that a teacher followed when moving from one point to the next in a lesson. Interpretations were often represented in the factors that teachers considered when making decisions and planning deliberate acts.

Teachers in the study made inferences about the emotions that students were experiencing, whether or not students were feeling motivated to work, and what and how they were thinking, and they attributed to students certain motives for behaving and responding as they did and, also, certain needs and desires.

It was earlier noted that teachers, when reporting their perceptions referred mostly to prominent features in classroom discourse and nonverbal behaviors. Discreet or subtle cues received little mention. It would appear from this that teachers in this study were making inferences about students' internal states on the basis of gross and clearly observable student behaviors but without attending much to the subtleties or fine details of student behaviors which, presumably, would be important indicants of students' inner states. How accurate these inferences of student states were is difficult to determine, but the empathy scores would indicate that they were not. Neither is there a research basis for assuming that teachers are accurate at interpreting or inferring. In fact the slight evidence available (Bloom, 1954; Shavelson, 1976b; and Taylor, 1968) points to the opposite being the case. Extensive bodies of research in areas of person perception, attribution, and expectancy formation, provide few clues to the answer to that question either.

No evidence was found, either in the stimulated recall protocols, or in the videotapes of lessons, that teachers checked on the accuracy of their interpretations, or thought about doing so. If interpretations are to serve well the purposes for which teachers were using them, namely, as determinants of decisions and deliberate acts, then it would seem that, as a basic requisite, interpretations be accurate.

Clearly, two intriguing and important questions are: (i) whether teachers can accurately infer students' internal states, and (ii) what kinds of information should be used to allow valid inference making in the classroom?

To begin to answer these questions, it may be profitable to view interpretations as hunches or postulates on which teachers base their reactions and tactics. The questions also prompt speculation about the existence of mediating cognitive processes which occur between perceptions and interpretations. How do teachers form interpretations? Are mediating cognitive processes instrumental in shaping these hypotheses or postulates? Do teachers carry round in their heads sets of rules for translating student cues into hunches or hypotheses about students' internal states? Is a diagnostic process involved?

Acceptance of any of the propositions implicit in the above questions must be tempered with a great deal of caution. Most of the questions are posited on an optimistic assumption that there is a process corresponding to the teacher's leap from perception to interpretation, but perhaps there is not. Efforts to confirm or deny the assumption could be bedevilled by the human problem of reflecting accurately on consciousness, as this quotation from stimulated recall protocols suggests.

> T: . . . If I had felt at that time that nobody knew what they were doing I would have presented more [examples]. I felt at that time that most of them knew what they were doing so there was no sense belaboring the point. . . . I got the feeling that they were ready to jump on it, they were ready to do it. There was no real hesitation. That's just a feeling you get. I can't explain how you get it but it's there—the feeling that they're ready to do it.

If the assumptions about mediating cognitive processes can be shown to have validity, then the notion of a teacher as a clinical information processor begins to take on greater credibility.

Tactical Deliberations (Prospective and Retrospective) and Reflections

Interactive thoughts were comprised of a relatively large number of prospective tactical deliberations, but few retrospective ones. The former featured prominently in interactive decision making and deliberate acts of teaching behavior.

Interactive Decision Making and Deliberate Acts of Teaching

The data on interactive decision making and deliberate acts contain several interesting pieces of information:

1. Usually, fewer than 10 interactive decisions appeared in the interview protocols for each lesson.
2. Teachers usually considered only two alternatives when making a decision.
3. Choice of alternative was influenced by consideration of two to three factors.
4. Usually, more than 20 deliberate acts per lesson were identified.
5. One or two factors were considered each time a teacher planned to follow a certain course of action without thinking of alternatives.

These findings are consistent with that reported by Clark and Peterson (1976) who observed that it was relatively rare for the teachers they studied to be thinking about alternative actions or strategies while they were teaching.

The results of this study also bear close resemblance to those reported by Morine and Vallance (1975) though it is difficult to make clear comparisons because the term *decision* was not defined by them. Teachers in the Beginning Teacher Evaluation Study reported making an average of from 9.6 to 13.9 decisions per lesson across Grades Two and Five, and reported considering an average of from 2.2

to 3.7 alternatives per decision.

If, as has been suggested, decision making is *the* basic skill (Shavelson, 1973), it is important to consider why there were so few interactive decisions in each lesson and why, in so many instances when teachers were planning a course of action, they failed to consider at least a second alternative. The figures reported in this study, and elsewhere, do not appear at first glance to provide support for those who theorize that teachers make hosts of individual decisions in a lesson (Farr & Brown, 1971; Gagné 1976; Shavelson, 1976b).

There are a number of possible reasons. Perhaps, as Jackson (1968) has observed, the pace of classroom life is so rapid and the demands for teachers to respond and to take initiatives so frequent and so insistent, that the teachers can do little more than just react to keep up. In essence, then, the suggestion is that classrooms do not offer conditions for much rational decision making except when there are lulls in activity. This seems plausible. On several occasions during the analysis of verbal protocols and videotapes in this study, it was noted that decisions rarely occurred during flurries of intense activity in the classroom. However this does not explain why, in the classroom where the pace seemed least hurried, the teacher (Teacher 6.2) reported the least number of interactive decisions. Personality variables may have been influential here.

A second reason could be traced to the interview procedures themselves. Videotapes of lessons were stopped an average of 40 or more times in a lesson so it is possible that the videotape was not stopped at points in the lesson where decisions were made. However, given the fact that teachers were asked to identify decisions during the interview, it is surprising that more decisions were not identified in one lesson at least, if they occurred. This explanation cannot be rejected but it is further discounted by the fact that stimulus points were numerous, averaging about one per minute, and were well distributed over the full lesson.

It is also likely that presage factors may partly account for the limited number of decisions involving two or more alternatives. All of the teachers except one were categorized as having concrete belief systems. Individuals with more concrete systems are considered to have, by comparison with those with more abstract belief systems, simpler, less differentiated cognitive structures, to be more dependent on authorities for guides and less adaptive and flexibile, to respond to complex problems in more stereotypical or less creative ways, and to have a smaller repertoire of heuristics and methods for problem solving. It seems reasonable to assume that teachers with these fundamental value positions and response patterns are likely to be less inclined towards consideration of alternative techniques, responses, and approaches in the teaching situation.

The finding by Marx and Peterson (1975), that some teachers make fewer preactive decisions and are more productive interactive decision makers, could be interpreted as being consistent with this proposition. Such teachers might be those who are more secure, more flexible, are active manipulators of the environment, need less structure, that is, have more abstract belief systems.

Evidence from this project relating to the above premise is not clearcut. The largest number of interactive decisions in any one lesson was identified in the protocols of the teacher with a System 4 belief structure, that is, the most abstract belief system, but the number was only marginally higher than for other teachers. Furthermore, over both lessons, the highest number of interactive decisions was identified in the protocols of this teacher and another with a System 1 rating (most concrete) on belief systems.

It is also possible that teachers in the study were not familiar with the model of the teacher as a decision maker and were not accustomed to thinking of their classroom behavior in terms of the decision making metaphor. Consequently, they may have found it difficult to relive their roles in the classroom and to express their interactive thoughts in a way which would be compatible with the decision making paradigm.

Another explanation may be found in the comments of two teachers. On several occasions in both interviews these teachers accounted for their actions at those times by saying, in effect, that it was customary for them to do what they had done. They may have been making *habitual responses*. Neither could say categorically that they had, or had not, thought about the behavior prior to engaging in it. They appeared uncertain as to whether conscious thoughts had given rise to their behavior, that is, whether their actions were premeditated. The following extracts from their interviews are examples of their states of uncertainty.

T: "Maybe I did make the decision without realizing it."

T: "I made the decision but not really consciously."

T: "There's another one [instance of choice of particular respondent] . . . either consciously or unconsciously, I don't know."

T: "It must have been subconsciously in my mind [to invite that student to answer]."

These comments were made by Teachers 1.1 and 1.2 but were not found in the interview data of the other teachers. It is interesting to note that both of these teachers had had considerably more teaching experience than any of the others. It prompts the speculation that teachers may not always be aware of the intellectual activity related to decision making behavior and that, with increase in teaching experience, awareness diminishes because teachers do not have to devote as much mental activity to planning their next move, perhaps because teaching responses have become automatic.

The last explanation that will be offered is that the ratio of decisions to deliberate acts may be a distortion of reality. An inverse ratio may in fact apply. This distortion could have been caused by the failure of teachers to report fully on alternatives considered—some reasons to account for this have already been given—or by the failure of interviewers to facilitate disclosure of these facts.

Whatever is the real situation with respect to ratio of decisions (conscious choice from two or more alternatives) to deliberate acts (consideration of only one course of action), it is apparent that the number of potential decision points is quite large, usually about 30 per lesson. Those who claim that teachers make or should make many decisions in a lesson may have some justification.

Generation of Alternatives. From the evidence presented in this study, it would appear that teachers behaved with limited rationality when making decisions in the videotaped lessons. The consistency with which low numbers of interactive decisions occurred in the protocols of all six teachers has already been discussed. Teachers also showed little variation in the number of alternatives considered. In the vast majority of decisions, teachers reported considering only two alternatives. This aspect of decision making warrants further investigation, but little light can be shed on it as a result of this study.

It would appear, however, that teachers were largely unconcerned about the range and quality of alternatives from which they made their choice. Instances when teachers reported reviewing the alternatives and considering more suitable alternatives in the protocols were extremely rare. The protocols did not provide any insights into how alternatives were formulated, but an impression was formed from listening to the audiotapes of the stimulated recall interviews that generation of alternatives was an effortless activity. Alternatives seemed to emerge, or pop up spontaneously, when the situation demanded it. As pointed out earlier teachers rarely reviewed the alternatives critically to see if better ones could be identified, whereas they did spend some time in selecting between alternatives, as shown by the fact that two or three factors per decision were considered when choosing among alternatives.

There are at least three interesting parallels here between teachers and physicians. The way teachers generated alternatives was reminiscent of the way, described by Elstein et al (1972), that physicians, during simulated medical inquiry interviews, leaped to a small array of provisional hypotheses to account for the medical facts and the range of symptoms displayed by their *patients*. In addition, the number of competing alternatives considered by the teachers was small, as was the range of competing hypotheses entertained by the physicians. Thirdly, the inattention by some physicians to negative instances parallels the teachers' apparent lack of concern about the value or worthwhileness of alternatives.

It seems reasonable to suggest that the processes engaged in by teachers, of generating, and choosing from, alternatives, bounded as they were by the human's limited capacity for rational thought, were further impeded by constraints imposed by the task environment, probably more stringent in the case of the teacher than the physician because the teacher has less time for making decisions, and has many more *clients* to deal with simultaneously. It is also probable that the range of alternatives which come to the teacher's mind is regulated by the size of the repertoire of alternatives which the teacher has at his disposal.

Decision Points. Most of the interactive decisions reported by the teachers in this study occurred at three points: (i) where there were indications to the teacher of student unrest, noise, and inattentiveness; (ii) when students publicly initiated questions and comments, and responded in unsatisfactory ways to teacher questions; and (iii) when a respondent to a question was required.

Two important points should be noted. Firstly, the specific nature of the nodes or decision points could not have been anticipated before the lesson. Certainly the occurrence of these kinds of incidents in general is predictable but not the specific details which would allow or encourage preactive planning for them. Secondly, nearly all of these decisions occurred within the framework of the lesson plans as outlined by the teachers (see Appendix N). Virtually none of these decisions constituted a revision of preactive plans and only a very few represented additions to the preactive plans.

The general pattern of distribution of decision nodes is broadly similar to that reported by Morine and Vallance (1975), but is at odds with the finding reported by Clark and Peterson (1976) indicating that teachers only considered alternatives when things were going badly. The teachers in this study showed a definite reluctance to change lesson plans even if the lesson was not running smoothly, and indicated a firm unwillingness to abandon their plans.

The majority of decisions were made at the points indicated above which did not coincide necessarily with stages where the lesson was going wrong. It is also interesting to note that the nodes of deliberate acts had a similar distribution pattern to that for decisions.

The implications of these findings, if they can be confirmed generally, are significant. Teacher education programs should include training to optimize decision making by teachers at these points, something which Bishop and Whitfield (1972) contend is largely negelected in current practice. If it can be shown that (i) teachers generally share this reluctance to rethink or abandon lesson plans in midlesson and that (ii) greater flexibility in lesson implementation is desirable, then ways of improving planning procedures should be investigated, and means of preparing teachers to improvise during lessons should be sought. Teachers themselves in this study recognized the value of contingency plans. Lack of these often meant that they had no alternative to turn to even if they had wished to.

If the tentative findings of this study can be confirmed on a larger scale, the value of the decision making metaphor to describe teaching in the interactive phase could be called into question, unless it can be shown that teachers can be trained to behave with increased rationality, to optimize decision making, and that this has an important bearing on teaching effectiveness.

Forfeit Decisions

The incidence of this phenomenon was very low, one or two in some lessons only, and appears not to warrant consideration in this study.

Cognitive Linking

All teachers revealed that they thought about links between the current lesson and past and planned ones. The incidence of this phenomenon in the protocols was also low, never more than five in any one lesson, but this may have been determined, to some extent, by opportunities for linking. In other words, close ties between this and other lessons might not have existed. There was no evidence, either, in the stimulated recall protocols, of integrative decision making, as defined by Morine (1975), though it may have occurred subconsciously. Integrative decision making was seen by Morine as the tool for linking together, in a systematic, coherent way, the single events in a lesson. The principle of establishing relationships between events in a lesson was, however, referred to by Teachers 1.2 and 6.2.

The notions of integrative decision making and cognitive linking have intuitive appeal and, though not salient in the samples of teachers' interactive thoughts in this study, may warrant further investigation.

Impulsivity

One of the specific problems to be investigated in this project was the ratio of impulsive to reflective teaching acts. The number of impulsive acts, defined as instances when the teacher did or said something while teaching without knowing why, was very low as already reported, but this casts no light on an answer to the question. This low incidence may, in part, be accounted for by the teacher's role definition in the stimulated recall interview. Pointing out occasions when he did not think was not part of the teacher's role in the interview. He was required to discuss interactive thoughts.

Most instances of an impulsive act occurred when the interviewer initiated the discussion on a segment, prompting the speculation that another interviewing style, with the interviewer cast in the role of initiator, might uncover many more instances of impulsive acts than were revealed in this study.

Self-monitoring by Teachers

The concept of the self-monitoring teacher has been endorsed by those who see the teacher as the essential agent in his own continuing professional development [see, for example, Brophy and Good (1974)]. A self-monitoring teacher is one who, in the spirit of self-inquiry, adopts an objective stance towards his own practice and seeks feedback about his impact on students.

There is evidence in this study that none of the six teachers was self-monitoring to any significant extent. The index of self-monitoring activity that has been used in making this assessment is the percentage of retrospective tactical deliberations in the interactive thoughts of teachers. This category of interactive thought was used for coding all the teachers' thoughts about their own past behavior in the lesson. In only one-third of all lessons did it rise above the 3% mark and then only to 6.9% as a result of one incident. The teacher in this instance was impressed by her power and influence in the classroom and was pondering her impact on a student during a lull in classroom activity.

The conclusion that the teachers were not self-monitoring to any significant extent in these lessons comes as no surprise since it is in line with speculation and some evidence about what teachers do in respect of self-evaluation of their own teaching behavior while teaching (Brophy & Good, 1974; Jackson, 1968). Elliott (1977) also reported a very low level of self-monitoring behavior in the 40 teachers in the Ford Teaching Project in the United Kingdom.

The reasons usually advanced for lack of self-monitoring activity by the teacher are insufficient time, ego-defensiveness, and cognitive overload within the lesson, and they probably have some legitimacy. The stimulated recall protocols also suggested another potential obstacle to the teacher anxious to be self-monitoring. The teachers in this study were sometimes surprised by aspects of their own teaching which they had not previously been aware of. Self-confrontation on videotape apparently was self-revelatory on occasions and evoked comments about self by some teachers even though the point had been stressed that the interview had no evaluative function.

Self-revelation was conveyed in statements like this—

> T: ". . . But I see now, it's kind of shocking, my different attitudes towards Child X who's really the same kind of boy who gets into the same sort of trouble, and Child Y. . . . So I'd better change there."

The impact of self-confrontation, or at least the self-revelatory dimension if it, is best expressed by a post-interview comment volunteered by another teacher.

> T: "I think it would be really worthwhile for a teacher to see that [a videotaped lesson] every so often because you don't really have a clue what you're like, or what you're doing, and how you're doing it. I think you could probably overcome many of your faults if you could see them. You don't realize they're even there until you see yourself."

The total impression created by these comments was that, for these teachers, the pool of classroom activity did not provide a reflecting surface which enabled them to obtain a clear impression of their presence and behavior in the classroom, and its effects.

The data in this study allow no firm conclusions to be drawn. It is not known whether or not teachers intended to be self-monitoring. If this was their intention, they did not appear very successful because self-monitoring, as indicated in the protocols, was infrequent and unsystematic. Of course it could well have been that teachers did not care to look, or did not know how to look, for feedback about self. On the other hand, there is some evidence which tends to support the notion that the classroom scene, which presents to the teacher's senses such a rapidly changing kaleidoscope of events, prevents the teacher from seeing a clear and stable image of himself. Taylor (1968) alleged that visual cues from students which could be used to provide feedback to the teacher are misleading, and Elliott's (1977) triangulation method for improving the capacity of teachers to be self-monitoring, which he claimed met with a measure of success, relied largely on *objective* feedback from sources external to the teacher.

Two problems worth considering are: To what extent is it possible for teachers to learn to monitor their own behavior while teaching? How adequate is this on-going feedback to the teacher? If, as seems likely, there are numerous impediments to self-monitoring by teachers during instruction, and if it is difficult to suppress interference with self-monitoring to an acceptable level, then the adoption of techniques for obtaining feedback from perspectives other than the teacher's, for use in post-lesson self-evaluation of teaching behavior would appear warranted.

Assessment by Teachers.

What has been said so far should not be taken to imply that teachers did not receive and use feedback for assessment purposes. They did, but it appears that their evaluation had an other-than-self focus. Teachers obtained and received feedback and used it in two ways: (i) to assess learners and (ii) to assess conditions for learning and lesson success. This is evidenced in the data on reflections which represented one of the two most frequently occurring kinds of interactive thoughts for all six teachers. As shown in Chapter V, most reflections were about student verbal behavior (questions, comments, and responses); student behaviors, characteristics, and work; lesson content and characteristics; classroom atmosphere and noise; and curriculum materials and resources. For most teachers, indicants of a successful lesson were student participation, absence of deviant behavior, and lesson momentum marked by lack of delays, interruptions, and slow-downs.

It is not easy to infer from the interactive data the cognitive processes teachers engaged in when they reported reflections, but it has been assumed that their use of judgmental and comparative terms implies an evaluative process.

Similarities between substantive components of perceptions and reflections prompt the question: Did teachers evaluate what they saw and heard? Or did they consciously screen the environment for certain kinds of information for evaluative purposes? The stimulated recall protocols do not provide an answer.

Anticipations

Anticipations represented for all teachers about 10% of the interactive thoughts in each lesson. Deviations from this approximate norm were small, as indicated by the range 7.0% to 13.5%.

Anticipations appear to have exerted an important influence on interactive decision making by teachers and on the ways that teachers responded to students. They were substantially represented in the factors which teachers said they had used when reaching decisions and planning deliberate acts in the lesson.

There were two major types of anticipations—expectations for students and predictions about lesson events.

Expectations

Expectations were generally of two kinds, those about academic performance of students and expectations about students' classroom behaviors and reactions. The stimulated recall interviews with teachers revealed that teachers used expectations to determine many of the things they did in the classroom.

1. Expectations about students' academic performance were used to set goals and standards of achievement for individuals and groups. These goals and standards were not always announced to the pupils concerned but were used by the teacher in assessing the quality of student work.
2. Teachers also based their choice of teaching strategy on expectations they held for students. For example, Teacher 1.2, anticipating that a group of students would have difficulty in understanding a concept, took them aside for an unplanned review of the topic.
3. In question-answer sequences teachers occasionally chose respondents from non-volunteers because they *knew* that the volunteer would be able to give the correct response. Their reasoning was that it would be more profitable to

encourage the non-volunteers to attempt an answer.

4. Teachers also used expectations to identify what one teacher referred to as *stand-bys,* students whom they fell back on to provide a correct answer when no other student could. Stand-bys were used where teachers seemed reluctant to give the answer themselves. Teacher 6.2, for example, stated a preference for using student models of answers and processes rather than adult models, and Teacher 3.2 was committed to having students discover answers rather than be told them.
5. During individual seat work, the pattern of contacts which teachers followed when checking and rendering assistance was frequently determined by teacher expectations. Teachers often went to the students whom they felt would need most assistance. In one instance this pattern was varied because the teacher wanted to avoid the class identifying the student she consistently went to first as the least capable.
6. On several occasions in each interview teachers reported noting that a student had not fulfilled the expectation held for him. The most common reaction of teachers was to register surprise.

For one teacher in particular, Teacher 3.1, these instances were regarded as problems to be solved. Her response, an atypical one, was to begin formulating hypotheses which would explain why performance did not match expectations. Solving the problem did not proceed beyond the hypothesis-formulation stage during instruction, presumably because of time restrictions, but the problem may have been set aside mentally for consideration later. In relation to this point, Teacher 1.1 commented that she preferred to think about students with problems in school work in the postactive phase of teaching.

> T: ". . . I handed out all the ones [completed work sheets] that were right but I kept the ones that had problems. When I look at them tonight, I'll see where to go with that group. . . . I don't make a decision like that in the classroom situation because there are too many things going on at the same time."

Other teachers appeared to regard these instances of unfulfilled expectations as problems but did not proceed beyond the problem noting stage. An example of this is provided:

> Teacher 3.2: "I really wondered what was wrong with him because he's not acting the way he normally does."

Expectations about student behaviors served other purposes.

1. They were most frequently used by teachers in the formulation of problem-circumvention strategies in a lesson. On the basis of expectations of deviant behavior, for example, they anticipated that problems which would disrupt class discipline would emerge and so they planned how to limit the possibility of the problem developing. For example, one teacher would not direct questions to two students whom she expected would be disruptive by engaging in

attention seeking behavior. For similar reasons another teacher planned a stage-by-stage relocation of her class rather than allow an undirected or uncontrolled migration.

2. Teachers reported that they were selective in their choice of students whose classroom behavior they monitored regularly. Students whom they *kept an eye on* were ones for whom they held expectations of negative behavior such as work-avoidance and non-compliance with classroom rules.
3. Student contact and dialogue with the teacher were discouraged by teachers who expected, for example, that students would be critical of their peers or would take up too much time.

These lists of ways in which teachers use expectations are not exhaustive but rather are representative of the most frequent uses reported by teachers in the study. The frequency with which such usages were reported, and their variety, suggest that expectations had a pervasive influence in teachers' interactive cognitive functioning. This influence extended beyond the more predictable uses of expectations for designating levels of attainment and work-productivity and identifying student targets for dyadic contacts, to the formation of classroom management techniques. The significance of these findings lies not in the discovery of their occurrence, since that has been long established, but in the fact that teachers knew that they were using them.

The next question to ask is whether the teachers gave thought to qualities of their expectations, such as accuracy and rigidity, to how well they used them, and to the consequences of using them. From what has already been said about self-monitoring of the teachers, it appears very unlikely that such critical analysis occurred during the lessons.

An interesting feature is that teachers were using expectations as a behavior control or problem-avoidance device. On the surface it appears to be a positive means for reducing the need for disciplinary action by the teacher, but it might also involve non-acknowledgement of students whom the teacher has identified as anti-social in the classroom. Consistent adherence to this kind of policy could lead to systematic distortions in the ways that teachers treat individual students. The potentially harmful effects of inappropriate expectations or of unconscious use of expectations again point up the value of self-monitoring practices by teachers.

Predictions

Predictions about future lesson events, the other major category of anticipations, were also used to plan instructional activity. The origins of these can probably be traced to the conventional wisdom that teachers accumulate with experience. They are really hypotheses about what will or will not work in a particular classroom and are probably some of the important basic elements in each teacher's grounded *theory* of instruction. As with expectations they also are important determinants of the interactive decisions and plans made by teachers. They warrant a more detailed analysis in subsequent research.

Feelings

Classrooms have been described as *affective deserts* and as places in which the serious and often joyless business of learning and teaching is transacted. While these descriptions are probably overstatements of the affective climate in most school learning contexts, classrooms do tend to be places where emotional restraint is encouraged and where expression of feelings is subdued. There is evidence from several sources that the six classrooms in this study also warrant to some extent this conventional description.

1. Low inference process data show few instances of enthusiastic praise or severe criticism. For example, in approximately 36 hours of observation there were only 49 and two occasions respectively during academic response opportunities when praise and criticism, as these variables are defined in the Expanded Brophy-Good System, were coded.
2. High inference ratings of teachers on empathy were very low.
3. The stimulated recall protocols contained only one instance of a teacher attempting to inject humour into the teaching situation.

Additional support for the above assertion appears in the reports by teachers of their interactive thoughts. The percentages of interactive thoughts in which teachers expressed feelings are generally low. Taken at face value, these percentages could be taken to mean that teachers experience few emotions during instruction. However, as was suggested earlier, percentages based on the frequencies with which feelings were reported could be misleading because emotional states endure and one reference to a feeling might represent an affective condition which persists for some time.

It seems likely, therefore, that the impression that classrooms are affective deserts is an illusion created by the teachers' efforts to keep emotions as an inner experience and to allow them infrequent overt expression. In respect of teachers, the outward appearance of tranquillity and nonemotionality belies the inner affective states. This matter will be considered further at a later point in this chapter.

The higher percentage of feelings for Teacher 1.1 in the first lesson can probably be accounted for by the fact that the lesson plan was seriously disrupted by the late arrival of student aides on whom the teacher was relying. This provoked considerable anxiety in the teacher, a feeling which recurred several times because their late arrival caused repercussions all through the lesson. Deviance which occurred as a result of this disruption also aroused feelings of annoyance, anger, and frustration.

This same pattern of emotional arousal occurred in the lessons of Teacher 3.1, and for similar reasons. Lessons did not go smoothly, there were interruptions and delays, and the lack of momentum caused the teacher considerable concern.

It may be a coincidence but a majority of times when the field detachment phenomenon was identified were in the protocols of Teachers 1.1 and 3.1. Kagan et al (1969) have indicated that this *tuning out* phenomenon occurred when teachers were preoccupied with such things as restructuring a lesson plan, lesson evaluation, and planning the next move. Because in this study field detachment often occurred at or near points when lesson plans were being disrupted, it appears likely that the *tuning out* was linked with arousal of intense feelings of anxiety. The incidence of this phenomenon was so low and the consequences of it so slight that it appears to have little significance.

The higher percentages of feelings reported in the interactive data might also be linked with certain personality traits. Teachers who reported more feelings in interactive thoughts, 1.1, 3.1, 6.1 and 6.2, were also the individuals who had higher scores on the anxiety dimensions of the personality test.

Information—Pupil, Information—Other, and Goal Statements

During the interactive phase of teaching, all teachers recalled information which they had acquired prior to the lesson. It was comprised of information which teachers had about their pupils and an assortment of information from a wide variety of sources including principles of teaching, beliefs about children, and past curriculum experiences. To a much lesser extent, teachers also reported interactive thoughts about student objectives in the lesson but it is unclear whether the objectives were expressive, that is formulated by the teacher during the lesson, or preactive ones. The two sets of goal statements, preactive and interactive, were never identical and, though obviously consistent with each other, varied in specificity. Statements about goals during the preinstructional interview were broad and general, whereas those appearing in the interactive data were specific and applied to individual students.

Information about Pupils

During the interviews interactive thoughts in the information—pupil category were disclosed mainly at points where dyadic contacts, public or private, occurred. Often the two or three interactive thoughts about pupils were enlarged into extensive case histories of pupils. All teachers engaged in this to a greater or lesser extent. It was one of the unexpected features of the stimulated recall interviews and, though it provided a lot of noninteractive data, it was not discouraged. Three points are worthy of comment. Firstly, it showed that teachers do carry round in their heads quite extensive inventories of information about some students at least.

The information in these inventories rarely included data from standardized test results though these were readily availabe. Terminology used by teachers to describe students was not technical, norm-referenced, or stereotyped. Instead, student descriptors tended to be common terms from everyday conversation rather than specialist terms drawn from the fields of psychological and academic measurement. The descriptors were also personalized and characterized by considerable diversity. The extent and richness of the case histories revealed in the stimulated recall interviews suggest that a careful analysis of these inventories could be rewarding. Improved record keeping methodologies for classroom use is one likely benefit.

The sets of opinions, attitudes, and facts comprising these inventories appeared to be the fertile bases from which teachers fashioned the individualized approaches they used with students. Evidence that teachers believed that they were customizing their treatment of students abounds in the protocols. Teachers identified students they didn't praise too much because the students didn't like it, students whose offers of participation were never refused because they were considered by the teachers to be shy and introverted, students who needed all the encouragement and help they could get because of alleged cultural disadvantagement, and so on.

Secondly, teachers were often repetitive. They tended to discuss the same pupils in the two interviews. It seemed as if some students were more prominent in the teachers' thoughts than others, a finding reported also in Brophy and Good (1974).

Thirdly, it is not known how consistent teachers were in the application of these customized treatment patterns. There was some evidence that they were and some evidence to the contrary.

The frequent occurrence of customized teaching behavior, that is, teacher responses tailored to suit individual students and based on teacher-perceived differences in pupils, gives added weight to the description of interpreting as a diagnostic process, and gives added credibility to the notion of a teacher as a clinical information processor. The part that interpretations played in decisions and deliberate acts has already been referred to. There appears to be an obvious parallel between the information gathering, interpreting, and decision making and tactical planning of the teachers in this study, and the data gathering, diagnostic, and prescriptive functions of clinicians.

Lesson Plans as Topological Workspaces

One of the most unexpected and perplexing features of the interview data was the almost total lack of reference to lesson plans. In all but one interview there were never more than two or three interactive thought units dealing with lesson plans. That one interview contained seven references to lesson plans. Before an explanation is offered several other points should be noted again.

1. Interactive decisions were made about essentially unpredictable specific issues such as choice of respondent, how to desist student noise, and how to respond to child initiated questions and comments. Decisions about broad aspects of lesson design were not taken interactively.
2. The general structure of lessons was outlined in lesson plans but little attention was given to specific matters such as teacher-student interaction.
3. Lesson plans were implemented without any major changes being made. Teachers showed great reluctance to make changes or to abandon lesson plans.
4. Teachers sensed when lessons began to deviate seriously from plans or when plans went awry. At these times the two teachers concerned disclosed in the interviews that they became tense and anxious and sought measures to ensure that the lessons got back on course.

One of the research questions to which an answer was being sought was whether preactive plans impinge on the interactive information processing of teachers. The answer to that question in respect of the teachers in this study appears to be that plans did not impinge on their interactive thoughts until disruptions occurred which jeopardized the successful implementation of the plan. Teachers did not report in the interactive data contemplating what part of the lesson plan came next. However the appearance of a subcategory of reflections dealing with lesson content and characteristics suggests that these teachers were monitoring developments in their lessons and were checking that they were proceeding according to plan. It would appear that the act of planning a lesson serves to program the teacher to act in a predetermined way. The teacher programs himself to operationalize a plan and then makes periodic checks to ensure that the lesson is *on course*.

The notion of a lesson as a *topological workspace* emerged as a useful way to describe what the author perceived lesson plans to mean to the teachers in the project. In the first place a lesson plan served a useful function because it defined for them an area of content, resources, and techniques with which they and the students would be working. This was the broad framework or workspace. They also recognized, as was reported in Chapter V, that they were planning for an event which was associated in their minds with a certain degree of uncertainty. Plans, therefore, teachers realized, had to allow for this uncertainty by possessing a looseness of structure and flexibility. The workspace therefore had to allow for some give-and-take, and for some adjustments and displacement of parts. What teachers did with plans to cause them to fit the circumstances in lessons, some of which are unknowable beforehand, is analogous to what happens to surfaces in the study of topology, often referred to as *rubber-sheet geometry*. Where lessons went awry teachers were able to *stretch* plans to fit new circumstances, to cope with new considerations. Within this topological workspace then the teacher works with his class.

It has already been noted, in reference to interactive decisions, that a very small number of interactive decisions reported by teachers in this study represent modifications to the plans, and virtually none of the decisions represent extensions to preactive plans. Morine and Vallance (1975) reported the same result, noting that unplanned decisions, decisions to include an activity that was not originally part of the lesson plan, comprised only about 3% of all interactive decisions.

The pattern is consistent and clear—preactive decisions or, more correctly, preactive plans and interactive decisions made by the teachers in this study were about two different sets of topics, one general the other, in the case of interactive decisions, specific and unpredictable.

If this conclusion applies generally to teachers then several questions would need to be investigated.

Does the teacher's task environment render it unlikely that he can make decisions to change or extend lesson plans during the interactive phase?

Is it desirable and possible to train teachers to be more flexible in the implementation of lesson plans? Very little is known about the ways the task environment of the classroom constrains teachers' cognitive functioning during instruction but some understanding of the effects of these constraints must precede prescription of models of teaching for use by teachers.

Other Information

Of the several subcategories of interactive thoughts in the information—other classification, only one, teaching principles, has been singled out for further discussion. This choice reflects an investigator interest.

Numerous teaching principles were cited by teachers in the stimulated recall protocols. Once again teachers went far beyond disclosure of interactive thoughts when discussing teaching principles, as they did when they elaborated their mental inventories about pupils (case histories) discussed in the previous section, and once again they were not discouraged from doing this by the interviewers. They were repeatedly asked, however, to distinguish between interactive and noninteractive thoughts.

Often teachers disclosed a principle which they had thought about interactively and then moved rapidly to a fuller explication of the pedagogical basis for their classroom behavior. What motives impelled them to do this, and all teachers did it, is not clear. Perhaps they were seeking to provide the interviewer with a justification for their teaching approach, it may have been an attempt at post-hoc rationalization, or it may have been that the single principle was an inextricable part of a network of principles which oriented their classroom behavior. Mention of one led naturally to an exposé of them all—a pandora's box type phenomenon.

It seems likely, therefore, that the distinction between interactive and noninteractive principles could be arbitrary, unreal, and unimportant. This is the assumption that has been made and it explains why the approach taken here has been to ignore the distinction between interactive and noninteractive and discuss principles of major consequence.

What are principles of major consequence? There appeared to be some overarching principles which exerted a pervasive influence on a teacher's classroom behavior. Other principles had a more localized application. The former are discussed here.

The statements that teachers made about pedagogic principles were not couched in professional or academic terms. There was an absence of technical vocabulary and jargon from related fields though a few of the more popular psychological expressions appeared from time to time. These probably owed their inclusion to teachers' familiarity with some of the more popular theories of learning and instruction. The principles were usually conceptually simple with few corollaries or qualifications, and were not stated in probabilistic terms.

Revelation of these principles is regarded as exemplification of the contribution that can be made by introspective methodologies to the study of teaching. The principles that were revealed by teachers under conditions of stimulated recall gave meaning to teaching behaviors many of which, to the uninitiated observer, would have seemed like capricious acts or things that a teacher did on an impulse or a whim. Their immediate value is in adding new dimensions to an understanding of the classroom behavior of teachers in the study but, eventually, their importance probably lies in the contribution that an understanding of praxis can make to reducing the impracticability of rational theories of instruction.

The Principle of Compensation. This principle was most fully explicated by Teachers 1.1 and 1.2 and was employed most frequently by them. It was also enunciated by Teachers 3.1 and 6.2. Observance of this principle necessitated an attempt on the part of the teacher to compensate the have-nots for their alleged disadvantages. Teachers believed that they discriminated in favour of the shy, the low ability group, and culturally impoverished children, for example, and they usually identified in the interviews the children to whom they applied these terms. An indication of the extent to which this principle was invoked by teachers is given by the incidence of the proactive teaching phenomenon in the verbal protocols. Twenty-two of the 27 instances of this phenomenon were identified in the interactive thoughts of Teachers 1.1 and 1.2. In the protocols of the remaining teachers it occurred very infrequently or not at all.

The Principle of Strategic Leniency. This principle is really just an extension of the previous one. In the application of rules to children regarded as needing special attention, Teacher 1.2 was consciously lenient. For example, she disregarded restrictions she had placed on the number of children who could speak at *Show and Tell* time if one of the have-nots indicated a desire to speak; or she tolerated their interruptions and unwarranted movement round the class. Stated differently, then, the principle of strategic leniency referred to the practice of bending the rules to give preferential treatment to the students regarded by the teacher as disadvantaged.

The Principle of Power Sharing. Teacher 3.1 was committed to avoiding the use of negative reinforcement. She claimed in the interview that she resorted to the use of rewards and punishment only when she *became desperate*. On one occasion when she did use a system of reward and punishment she reported an acute feeling of guilt. The commitment of this teacher to avoidance of negative reinforcement was made apparent to the observer at times when the class was inattentive or noisy and not working productively. Her frequent response was: "I like the way Child A is working/listening/sitting up/behaving." When this strategy was not effective, a sense of powerlessness in the teacher could be inferred from her part of the dialogue in the stimulated recall interview.

What would not be apparent to an observer was that the children she chose to commend were ones whom she perceived to be class leaders, ones whom she assumed exerted some influence over peers by virtue of their having that leadership position. Her *theory* was that she could use the informal structure of peer influence as an instrument for dispensing her own influence in the class. In this sense then she was sharing power to influence with the informal power structure of peer influence.

The Principle of Progressive Checking. The principle of progressive checking was employed consciously by Teacher 1.1 and entailed making intermittent interruptions during seat work by the low ability group to allow for periodic checking of progress, identification of work problems being encountered, and for giving encouragement. By doing this the teacher also reasoned that she was providing stimulus variation for a group of children with low attention span for whom she considered variability necessary for enhancing learning.

In some respects this principle appears sound and practical. From another point of view it may appear to have disadvantages. For example, the frequent interruptions may cause the students to feel frustrated. A decision when to use it or when to stop using it would be dependent on how students reponded to it, which is why the notion of the self-monitoring teacher may be so significant and why an ability to *read* accurately students' inner states and feelings could be so important for the teachers.

The Principle of Suppressing Emotions. All teachers invoked this principle, some more than others, though this may have been related to circumstances in lessons. At times, mainly when they were under duress, teachers strove to suppress the feelings they were experiencing. The attempt to do this is exemplified by the following two excerpts from interviews with Teachers 3.1 and 6.1 respectively.

> T: "So I was purposely trying, forcing myself to be patient. . . . I was really putting pressure on myself not to get uptight . . ."

> T: "I've always got to be very careful with this class. The whole lesson is already quite exciting to them so I have to be very low key. That really goes against

> my personality because I like to be exuberant and get the most out of kids. But for something like this I have to really keep my voice deliberately quite low and really low key . . . I have to do this a lot with this class because of them being such an excitable class."

Adoption of this principle by teachers was based on a view of themselves as emotional catalysts. If they were noisy, the class would become noisy; if they wanted to induce a state of quiet and calm in the class, then they had to project this in their own behaviors.

This principle was frequently used as a classroom management strategy. Teachers seemed concerned that if they appeared too exuberant then the class would follow suit and classroom disorder would result. Conversely, to restore order, teachers would become silent and project an image of calmness and quietness. Here is a quotation from Teacher 3.1's protocols.

> "That was in a quiet calm voice to quiet and calm the kids instead of their getting excited. There was a put-on at that particular time to get a particular response."

Teacher 6.2 discusses one of the consequences of this effort to suppress feelings.

> "I'm thinking that I'm getting after these kids a lot and they're really nice kids but somehow I don't know how to deal with the frustration I'm [teacher's emphasis] feeling."

Teachers' use of this principle was manifested in several ways, principally the following:

1. Maintaining silence for a lengthy period.
2. Using nonverbal means of communication. Teachers consciously used gestures, glances, pauses, and stares to suppress unbridled enthusiasm or undesirable behavior

by students.

This practice of suppressing emotions was also sometimes coupled with another maxim. Teachers 3.2, 6.1, and 6.2 in particular, and others to a lesser extent, sought to protect students' self-concepts. This occurred most often during public teacher-student discussion. These teachers stated a reluctance to tell a student that his answer was incorrect or unsatisfactory, especially if he was trying or enthusiastic as the following quotations indicate.

> Teacher 3.2: "I really try not to say 'no' . . . if I can avoid it. Sometimes it's unavoidable. Sometimes if it's very silly, I'll say 'no' if they're just clowning around. But if they're trying and they're just making mistakes, then I try not to say 'no.'"

> Teacher 6.2: ". . . I try a lot of times not to say 'yes' and 'no' or 'right' and 'wrong.' I'm very conscious of that all the time. I don't think it's wrong to say 'no' but I think you have to use the word, in an academic sense, very carefully. Especially with the particular children I have . . . some of the children I have."

> Teacher 6.1: "_____'s sentence wasn't that good. I never quite know whether to . . . I can't say, '_____, that's not very good,' because the other kids would notice it right away. I often wonder how far you go. You can't discourage them and yet there's a point that you've got to come to and say, 'Well maybe it could have been a little bit better, _____, if you'd added such and such. I remember thinking that at the time, and thinking, 'No, this is not the time to do it.' It was the wrong time to do it. It was the wrong time because they were so enthusiastic about their sentences."

Teachers tried to veil their unfavourable judgments of students' answers by resorting to the use of innuendo, and rejected providing direct feedback even at the expense of compromising their academic standards.

Teachers were not always so concerned about being so protective. They were less particular about applying this maxim if the incorrect answer came from a student who was bothersome or inattentive.

Another motive for applying this principle appeared to be their desire to nurture student participation and interest which were, for them, important ingredients in a successful lesson.

Their dual goals of preserving students' wholesome self-images and retaining lesson momentum which appeared to motivate these teachers add some weight to Kounin's (1970) claim that the social dimension of classroom life is one of the prime concerns of teachers. Further evidence in support of this comes from the desire of Teachers 1.1, 3.1, 3.2, and 6.1 to appear just. Though not stated so clearly by Teachers 1.2 and 6.2, it was implicit in many of their interview comments too.

Introspective Methodology

Conduct of Stimulated Recall Interviews

The evidence presented in Chapter V on aspects of stimulated recall interviews generally supports the assertion that interviewers were able to enact the role defined for them. In most cases they took a small part in the initiation of discussion, but were then able to respond effectively to teachers' initiatives with questions to encourage teachers to extend or clarify their initial disclosures. The occurrence of interviewer verbal behaviors which might invalidate the recall data, such as questions and comments which could even subtly coerce the teacher into saying things he did not want or intend to say, were extremely low. Some role difficulty was experienced in interviews with Teachers 1.2 and 6.1, both of whom appeared reluctant to stop the tape and initiate discussion. Their reluctance probably is related to certain basic personality factors. Both had scores on the 16PF which indicated introversion. Teacher 1.2's personality profile showed tendencies towards conformity, conservatism, and introspection, and similar characteristics appeared in Teacher 6.1's scores. Once the tape was stopped and discussion invited both teachers conversed freely. The quality of their protocols was similar to those of the other four teachers so whether teacher or interviewer initiates the discussion may not always be a critical issue.

Among the interviewers there was general agreement that the establishment of good rapport between teachers and interviewers and the use of counselling skills were essential to the success of this type of interview.

Once teachers had overcome some initial apprehension, they apparently enjoyed the experience and found it beneficial. Several times they expressed surprise that they were able to remember so much of their thoughts during the lesson as shown by this teacher aside.

> T: "Yes, I remember even thinking it. It's funny, you remember what you were thinking. You probably don't even think you're thinking. The others have found the same thing. Once you start going, you know that you have. I'm surprised, because I thought I would just be sitting here. But I can remember thinking that, thinking 'It's funny they would do that.' . . . I can remember it going through my head very vividly."

One event which occurred throughout the interviews with all six subjects was that they did not restrict themselves to disclosure of interactive thoughts. Frequently they went from discussion of interactive thoughts to making postactive comments, to a discussion of features of their own teaching style, or to a detailed commentary on children. From experiences with pilot studies it was anticipated that this would happen and the role of the interviewer was defined accordingly. It probably enriched the verbal data but it posed problems for coding interactive thoughts because the distinction between interactive and noninteractive thoughts was not always made clearly, or made at all.

Success in stimulated recall interviewing is also dependent on the interviewer's ability to listen attentively to what the teacher is saying, analyze it, and then formulate appropriate questions. The variety of potentially useful leads in a piece of teacher discourse presents a dilemma. Interviewers probably need considerable practice in this. In addition, the skills involved and the leads to be followed might need careful specification.

The notion of using a variety of approaches to stimulated recall interviewing appears to merit further investigation. Initially, it may be wise to continue conducting open-ended stimulated recall interviews with teachers to see what common concerns, cognitive processes, and other phenomena emerge. Once teachers become accustomed to the routine of interviewing and specific problems are identified, roles of the teacher and interviewer should probably be redefined to suit new purposes and goals.

The suggestion has already been made that it might be profitable to see if teachers' interpretations about students match the students' own expressions of their thoughts and feelings. Stimulated recall techniques might also be used to examine what the bases, if any, are for teachers' interpretations—do they see and hear events in the classroom which initiate the interpretation process? It would seem to follow that, as specific questions such as this are identified, stimulated recall procedures should be adjusted.

This study has also revealed that teachers tend to stop the videotape of the lesson at similar points for recalling interactive thoughts. It was also noted that there were occasions when the interviewer stopped the tape and teachers reported that they had no interactive thoughts. These two facts suggest that there may be points when it could be profitable for teachers to do more interactive thinking than they do currently. At the same time the common recall points might be indicative of critical incidents in instruction. A study of what teachers think and do at these points could result in reconceptualizations of the prescriptive formulas and skill models presently recommended for use at these points.

Data Reduction

SATIT, the content analysis system used to code interactive thoughts of teachers, was developed by the investigator for this research project. The eleven categories of this system appear to constitute a facet, that is, all portions of the protocols identified as interactive were codable by this system. Further trials with protocols from other teachers should be conducted to confirm this.

Satisfactory reliability levels with briefly trained coders were obtained but further refinements of rules for unitization are needed. Coding disagreements were mainly caused by

(i) difficulty in distinguishing between interactive and noninteractive thoughts;

(ii) absence of teacher oral emphasis in typed transcripts;

(iii) different interpretations caused, in most instances, by lack of knowledge of contextual data;

(iv) inadequate punctuation (an infrequent cause).

From this limited application of the system and the results obtained it would appear that the system warrants further use and development.

The use of the low inference classroom observation system for describing the points at which the tape was stopped by teachers and their interactive thoughts disclosed met with only partial success. Many stimulus points could not be described using this system but the carefully defined terminology was used extensively and proved helpful.

Introspective Data, Its Reliability and Validity

The data obtained by introspective means in this study are complex and analysis of them poses a real challenge. In the opinion of this investigator the data are also rich in meaning and, even if the unravelling process is difficult, it appears worthwhile. It should be noted that numerous other features in the data have not been reported, and many of those that were have not been fully exploited.

The matters of reliability and validity of the data have not really been attended to. Considerable forethought was given in the design of the interview schedule to ways of reducing the possibility of obtaining invalid data. Also, in training, an effort was made to expunge questionable procedures from interviewing styles. Nevertheless it must be recognized that humans may, intentionally or unintentionally, not report fully or accurately their thoughts, their recall may be subject to bias, and there may be a deeper motivational structure for reporting as they do that they are not aware of. And yet, what teachers said they were thinking appeared consistent with events on videotape, and recall of observable events, where it could be verified, was highly accurate (see Table 18). There were also numerous instances when teaching styles and what teachers said they believed in were compatible with the descriptions of teachers' belief systems derived from projective answers (This I Believe Test)—there were also occasions when there wasn't a match.

All this discussion on validity and reliability of the verbal report data is conjectural so validity and reliability can be assumed but not demonstrated or guaranteed. These reservations are major limitations and place restrictions on power to generalize from the data in this study.

Relationships between Teacher Information Processing and Teacher Presage and Contextual Variables

Contextual Variables and Teacher Information Processing

The search for prima facie evidence of relationships between contextual variables and teachers' information processing styles availed little. This could have been expected in a research project which involved so few teachers and so few videotaped lessons, and which featured a volunteer sample of subjects.

Though the 12 lessons, as well as being in two different subject areas, had many distinctive features (see Table 26 and accompanying comments), instructional methods tended to be conventional which may explain why the information processing styles of the teachers were similar. This may also be partly the reason why there was no clearly identifiable pattern of relationships between contextual variables (grade level and subject area) and teachers' information processing styles. Morine and Vallance (1975) also found only slight variations across grade levels on teacher responses to the stimulated recall tasks. The absence of any apparent relationship might also be accounted for by the lack of sensitivity of SATIT, the content analysis system, to kinds of information processed by teachers which might be markedly different. Lesson content is the one that comes most readily to mind.

One point, noted earlier, was that Teacher 6.2, who reported fewest interactive thoughts per minute (see Table 31), was in the classroom where lesson tempo, as measured by the rate of codable events, was slowest. This is to be expected but logically it should also follow that, if the lesson is unhurried, the quality of information processing should also improve. This improvement in quality might be revealed in increased rationality, for example, a higher incidence of interactive decision making. However Teacher 6.2 also reported the fewest decisions of any teacher. It was stated earlier that where lesson tempo was very high teachers made few decisions but proportionately many more deliberate acts. It would seem advisable to research further the link between lesson pace and quality of information processing. Such a link if established could have profound implications for class size, teaching strategies, and organizational aspects of classroom teaching.

Teacher Presage Variables and Teacher Information Processing

There is the same dearth of evidence of relationships between these two sets of data as for the previous two sets. The reasons are also probably much the same, smallness of sample size and few marked contrasts among teachers on presage variables. Teachers in the sample had had widely different periods of teaching experience but this difference did not manifest itself in the ways teachers processed information.

A suspicion based on impressions formed when studying the interview transcripts, that one teacher who seemed to be making many more negative judgments and remarks about pupils would have an unfavourable attitude toward students, was not confirmed by scores on the MTAI.

The marked contrast in belief systems between Teacher 3.1 and the rest of the sample was not reflected in the information processing data except in one respect. Teacher 3.1, with the abstract belief system—all others were predominantly concrete—was the only teacher to form hypotheses to explain why teacher expectations for students were not fulfilled when such mismatches occurred. This might be taken to indicate that Teacher 3.1 was more open to making adjustments to expectations than the other teachers, a difference which would be compatible with the relative positions of Teacher 3.1 and the other teachers on the concrete-abstract dimension of belief systems.

Chapter VII

SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Outline of Research

Writers and researchers in education have recently begun to show interest in the cognitive processes of teachers during instruction. Among such groups there is increasing recognition that research into cognitive processes, assumed to be the precursors and determinants of teaching acts, might provide clues vital to an understanding of teaching and to improving the quality of classroom practice and programs of teacher education.

Problems

This study investigated the interactive thoughts of teachers using an introspective technique, stimulated recall from videotape. The following topics were researched: (i) kinds of information processed by teachers during instruction; (ii) cognitive processes used interactively by teachers in thinking about instruction; (iii) other cognitive phenomena occurring in teachers' minds during the interactive phase; (iv) potential of the introspective methodology for studying teachers' cognitive processes; and (v) relationships between teacher presage and classroom contextual variables on the one hand and ways teachers process information interactively on the other (prima facie evidence only was used).

Methodology

Introspective reports of teachers' interactive thoughts were obtained from a volunteer sample of six teachers, one at each of the first, third, and sixth grade levels, in each of two schools. These reports were obtained during interviews in which teachers' recall of their interactive thoughts was facilitated by showing them videotapes of lessons taught just prior to the interviews. Twelve interviews were conducted, two with each teacher, using videotapes of lessons in Language Arts (Grades I, III, and VI) and Mathematics (Grades I and III) to stimulate recall of interactive thoughts. Before each lesson, preinstructional interviews were conducted to obtain details of teachers' lesson plans.

Process data in each lesson and in a further six to eight hours of coding per classroom were obtained using the Expanded Brophy-Good Teacher-Pupil Dyadic Interaction Classroom Observation System and eight high inference rating scales.

Presage data on teachers were collected using Cattell's Sixteen Personality Factor Questionnaire, Harvey's This I Believe Test of belief systems, and the Minnesota Teacher Attitude Inventory.

Analysis Techniques

Transcripts of the stimulated recall interview data were prepared and analyzed at two levels. At a micro-level the transcripts were coded using a content analysis system developed specifically for this data by the investigator. The coding unit was an ideational or thought unit. Each unit was then placed in one of 11 interactive thought categories—perceptions, interpretations, prospective tactical deliberations, retrospective tactical deliberations, reflections, anticipations, information—pupil, information—other, goal statements, fantasies, and feelings. For each lesson frequencies in each category were then expressed as a percentage of the total number of interactive thoughts reported for that lesson.

Thought units in each of six categories were then further subdivided on a content basis. The distributions across subcategories of the thought units in these six categories were then expressed in percentage form, also on a lesson by lesson basis.

At a macro-level of analysis the transcripts were examined for certain phenomena—decisions, forfeit decisions, deliberate and impulsive acts, cognitive linking, field detachment, externality, internality, principles, beliefs, rules, case histories, and instances of accurate or inaccurate recall by teachers. The frequency of occurrence of each phenomenon in each lesson was recorded.

Conclusions

This investigation of teachers' interactive thoughts was posited on a model of the teacher as an information processor. The research project was undertaken to seek answers to two basic questions: (i) What kinds of information do teachers process during the interactive phase of teaching? (ii) What cognitive processes and phenomena characterize the mental activity of teachers during instruction?

No generalizations about the population of teachers from which the subjects were drawn can be made because the sample of teachers was small and random sampling procedures were not used in their selection. Furthermore, any conclusions reached about the sample as a whole or about individual teachers must be regarded, at best, as very tentative since interactive thought data were gathered from only a small, nonrandom selection of lessons. The following conclusions have to be considered in the light of the above qualifications.

Interactive Thoughts

Analysis of teachers' introspective reports of their interactive thoughts showed that all teachers processed the same kinds of information but in varying amounts. The information consisted of:

1. Perceptions of what students were saying and doing. Few of these perceptions were the less apparent, more subtle nonverbal cues such as facial expressions, glances, and other outward signs that might be vital clues to inner states of students.
2. Meanings or interpretations that teachers attached to perceptions of students.
3. Tactics that teachers were considering using in the next phase of the lesson, and a relatively low number of thoughts about tactics that they had already employed.
4. Contemplations about past events in the lesson, principally students' verbal and nonverbal behavior, student work set, lesson content, and characteristics of lessons.
5. Expectations for students and predictions about future events in the lesson or about directions that the lesson might take.

6. Factual information that the teachers brought to the lesson and retrieved from memory during the interactive phase. This information was about pupils, and consisted mainly of personal subjective data which the teachers had accumulated about students, but it also included information on a wide range of other areas, principally, curriculum content, lesson plans, past curriculum experiences, principles of teaching, and beliefs about children.
7. A relatively very few thoughts about the objectives to be achieved by students in the lessons.
8. Thoughts about personal affective states which changed as teachers reacted to students and events in the lesson.

Though the percentage distribution of these kinds of thoughts varied from teacher to teacher and from lesson to lesson for the same teacher, there are some generalizations that can be made.

1. All but a very few of the teachers' interactive thoughts were relevant to the lesson and classroom participants.
2. Teachers thought about lessons plans and goals only when the lesson was not going according to plan. This was attributed to the fact that lesson plans were clearly formulated, if only in outline form. It was thought that the process of lesson planning appeared to *program* the teacher who then did not need to give conscious thought to lesson plans unless the lesson was not going smoothly.
3. Teachers were not self-monitoring to any significant extent. They infrequently and unsystematically gave

consideration to their own teaching style, its effectiveness, and impact on students.

4. Teachers seldom checked the accuracy of their interpretations, that is, the inferences they made about the covert cognitions of students or about their affective states. They operated on the basis of hunches and intuitions.

Interactive Thought Processes and Other Phenomena

Decision Making

1. Some of the mental activity of teachers in the interactive phase could be represented in terms of a decision making model but, probably because of the constraints of the task environment, their decision making was of limited rationality. Teachers also tended to be satisficers rather than optimizers.
2. Teachers did think about tactical moves to be made in the lessons but usually without considering alternatives.
3. Interactive decisions were made at points in the lesson, specific details of which were largely unpredictable prior to the lesson. Interactive decisions were mostly about the nature of specific contacts with students and fitted within lesson plans. Few changes were made to lesson plans as a result of interactive decisions.

Expectations

Teachers made extensive use of expectations to:

1. Set goals and work standards for students.
2. Plan or select teaching tactics.
3. Select respondents to questions.
4. Distinguish a priori between those who knew the answer and those who did not.
5. Determine the sequence of private dyadic contacts with students during seat work periods.
6. Anticipate problems in lessons and design problem-avoidance strategies.

Clinical Information Processing

It has also been tentatively concluded that, to a limited extent, the way these teachers thought about instruction could be conceived of as clinical information processing. It has been hypothesized that the intellectual activity of interpreting or making inferences about students' covert mental life and affective states, and of then planning customized responses to students, may involve some of the basic diagnostic and prescriptive processes of the clinician.

Problem Solving

Very little of the teachers' interactive thinking fits the problem solving paradigm but one teacher was a more frequent problem senser than the others. Occasionally teachers identified problems. Situations which constituted the cores of the few problems which were identified were (i) student failure to grasp a point; (ii) teacher inability to find a way to get the student to grasp a point or understand; (iii) student achievement or behavior which does not match the teacher's expectations for the student. For the most part, solutions to problems in (iii) above were not sought. Only one teacher ventured hypotheses about the cause of the disparity.

Principles

Teaching behavior in certain kinds of situations which varied from teacher to teacher was regulated by conscious reference to certain overarching principles. These principles varied from teacher to teacher though some were common to two or more.

Cognitive Linking

Teachers consciously attempted to relate events in the lesson to prior and future curriculum experiences but cognitive linking was not a salient feature in the information processing of teachers.

Field Detachment

This was a rarely occurring phenomenon and did not appear to be a significant feature in teachers' information processing.

Introspective and Data Reduction Methodologies

1. Introspective techniques, involving stimulated recall from videotape records of teaching behavior, offer a viable means of studying the covert mental activity of teachers in the interactive phase of teaching.
2. The procedures for conducting the stimulated recall interviews used in this study provide practical guidelines for researchers to follow.

3. The data reduction techniques used in this study, including the System for Analyzing Teachers' Interactive Thoughts, offer a promising starting point for development of means of analyzing teachers' introspective protocols.

Relationships between Teacher Information Processing and Teacher Presage and Contextual Variables

1. Prima facie evidence of the existence of any relationships could generally not be found though one teacher, rated as having an abstract belief system based on scores of the This I Believe test in contrast with all other teachers in the sample who were rated as concrete, appeared to be more open to making adjustments to the expectations held for students.

Implications and Recommendations

Research

Research into covert mental activity of teachers during instruction has only just begun. This study represents a small beginning but it offers evidence that inquiry in this field, using the concept of the teacher as information processor and introspective methodologies of the type reported here, has potential for providing insights into the *deep structure* of teaching.

As a first step, further research needs to be conducted to identify some of the more common features of teachers' interactive information processing. At the same time the present study has prompted speculation about research leads which might be worth pursuing. Topics which, on a purely intuitive basis, would appear to warrant early consideration in research are:

1. Is accuracy of teachers' interpretations and expectations related to teaching effectiveness?
2. How accurate are (i) teachers' interpretations of students' covert cognitions and affective states? (ii) expectations for students?
3. How do teachers make estimates of students' internal states? How are expectations formed?
4. Can teacher accuracy in making interpretations and forming expectations be improved? How?
5. Is interactive decision making a salient feature in classroom teaching?
6. What circumstances within teachers' task environments constrain interactive decision making?
7. How can interactive decision making be optimized?
8. How can procedures for preactive planning of lessons be improved to enhance lesson quality?
9. Do self-monitoring practices by the teacher significantly enhance quality of teaching?
10. What factors impede self-monitoring by teachers?
11. What procedures can be adopted to facilitate self-monitoring practices in teachers?
12. Is there a relationship between lesson pace and quality of information processing by teachers?
13. What categories of information about students do teachers

carry round in their heads? What are the implications, if any, of the components of these mental inventories and the ways teachers assemble them, for record keeping methodologies for use in classrooms?

14. To what extent is the cognitive functioning of teachers compatible with a model of the teacher as a clinical information processor?

Teacher Education

At the practical level of preservice and inservice teacher education, recommendations which have strong intuitive appeal but which require corroborative support from more extensive research or field trials are:

1. Use stimulated recall procedures with students to provide teachers with feedback on their teaching.
2. Increase teacher awareness of the range of cues provided by students in the classroom and train teachers to identify and accurately interpret them.
3. Give preservice training in interactive decision making using simulated materials and environments.
4. Encourage teachers to check interpretations, expectations, and other hunches about student states on which choice or planning of teaching tactics is based.
5. Develop methods to facilitate self-monitoring by teachers.

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APPENDICES

APPENDIX A

DESCRIPTION OF CATEGORIES IN THE LOW INFERENCE CLASSROOM OBSERVATION SYSTEM

Section I. Summary of Categories in the Expanded Brophy-Good Teacher-Pupil Dyadic Interaction Classroom Observation System

Section II. Definitions of One Modified Category and Two New Categories in the Expanded Brophy-Good Teacher-Pupil Dyadic Interaction Classroom Observation System

Section I

Summary of Categories in the Expanded Brophy-Good Teacher-Pupil Dyadic Interaction Classroom Observation System

The major aspects of classroom life coded by this system are represented by the four cells in the diagram appearing below. Within each cell are the sub-categories of those four aspects which are then further broken down into still smaller units.

	Public response opportunities	Private dyadic teacher-pupil contacts
Teacher afforded	A.	C. I. Work-related II. Personal III. Procedure-related IV. Behavior-related V. Don't know
Student initiated	B. I. Student Initiated Questions II. Student Initiated Comments	D. I. Work-related II. Personal-related III. Don't know

A. Teacher Afforded Response Opportunities

The three key aspects of this category of classroom event are:

(a) they are public interactions between the teacher and a child, intended to be monitored by the class or group with which the teacher is working;

(b) they occur when the teacher asks a question requiring either a verbal or nonverbal response;

(c) only one child makes the response.

For each response opportunity that is coded, information has to be checked off in each of four subcategories: (1) type of response opportunity; (2) level of question asked; (3) quality of child's answer; (4) nature of the teacher's feedback reaction.

(1) Types of response opportunity

Predesignated (PRE):	teacher names the child first and then asks a question;
Non volunteer (N. VOL):	teacher asks a question first but calls for a response from a child who has not raised his hand;
Volunteer (VOL):	teacher asks a question first and invites a response from a child with hand raised;
Called out (CALL):	teacher asks a question but a child calls out the answer before the teacher has a chance to select a respondent; the teacher nevertheless responds to the child who called out the answer.

(2) Level of question asked

Process (PCSS):	question requiring student to integrate facts or show knowledge of their relationships.
Product (PROD):	question for which a specific correct answer is sought.
Choice (CHOIS):	question requiring an answer to be selected from one of the alternatives presented.
Self Reference (SELF REF):	question requiring child to make a non-academic contribution to the classroom discussion. This type of question has then to be further classified as subject-matter related (SUB) or non subject-matter related (NON SUB) and then whether it requires the child to show a preference (PREF) or to ~~give~~ information about his past experience (EXP).
Opinion:	question requiring student to take a position on an issue or to predict the outcome of an experiment or hypothetical situation. If the child gives no response (NR) this is coded. On the other hand if the child does respond, the teacher's reaction to

the answer is coded: if it is praised (‡), criticized (-̄), ignored (0), accepted (ACPT), integrated (INTEG) into the ongoing discussion, or if the teacher disagrees (DISAG) with the child's opinion.

(3) Quality of child's answer

The child's answer is coded as correct (+), partially correct (±), incorrect (-), or no response (NR) but, if the child indicates that he doesn't know, this item of information is also coded.

(4) Nature of the teacher's feedback response.[1]

The teacher's reaction to the child's response has been categorized as terminal or sustaining. Reaction which is terminal, that is, it has the effect of terminating the interaction with the child, could be one of seven types. The teacher may praise (‡), criticize (-̄), provide no response (NR), give process feedback (PCSS), give the correct answer (GIV ANS), ask another (ASK OTH) child for the answer, or the answer may be called out (CALL) by another student. Reaction which is sustaining, that is, it has the effect of prolonging the interaction, could be one of three kinds. The teacher may repeat the question (REPT Q), rephrase the question or give a clue (REP or CLU), or ask a new question (NEW Q).

B. Student Initiated Response Opportunities

1. Student Initiated Questions

This category of response opportunity is used if the student asks the teacher a question regarding the subject matter under discussion or some other matter. If the student calls out (CALL) the question without prior teacher approval, this point is coded and also if the question is relevant (REL) or irrelevant (IRREL). Two kinds of teacher reaction to the question, praise (‡) and criticism (-̄), are coded if they occur, and also types of teacher feedback. The teacher may provide no feedback (0) (i.e. ignore the question), delay (DELAY) her answer, not accept (NACPT) it into the discussion, provide a brief or long answer or she may redirect (RDRCT) the question to another student. Three other categories praise (‡), criticism (-), and warning (WARN) are provided if the teacher makes a reaction related to the student's behavior in initiating the question.

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[1] Modifications to the subcategories of teacher feedback as defined in the Expanded Brophy-Good System were made and are reported in Appendix A, Section I.

II. Student Initiated Comments

The details surrounding a student initiated comment that are coded are very similar to those for a student initiated question. All but three teacher response categories, brief, long, and redirect (RDRCT) are retained. They are replaced by another three. The teacher may accept (ACPT) the student comment, integrate (INTEG) it into the class discussion, or may use it to shift the direction of the class discussion.

C. Teacher Afforded Dyadic Contacts

I. Teacher Afforded Contacts (Work-related)

These are instances when the teacher makes private contact with an individual child about his work. Several features of these contacts are coded. The contact may be long, brief or it may be one in which the teacher just observes (OBSV) without entering into verbal interaction. If the contact is a long or brief one, praise (‡) or criticism (-) is coded also if the teacher's comments include such reactions. A don't know (?) category is used if the interaction between teacher and child is not audible to the coder.

II. Teacher Afforded Contacts (Personal)

These contacts do not involve either work content or procedure but are of a strictly personal nature.

III. Teacher Afforded Contacts (Procedure-related)

Within this category a distinction is made between those instances when a teacher seeks a favor (child helps in running the classroom) and those in which the request have to do with getting the child ready to work. The latter are coded as management (MANAG). Thank you (THANKS) is coded if the teacher thanks the child following the management or favor request.

IV. Teacher Afforded Contacts (Behavior-related)

This category is used whenever the teacher makes some comment on the child's classroom behavior. They are subdivided into praise (‡), non-verbal intervation (NVI), warnings (WARN), and criticism (-). Errors which the teacher makes when warning a child are also noted. Three kinds of errors, target errors (TARG), timing errors (TIM), and overreactions (OVERT) are coded. The no error category is used whenever the teacher does not make one of the three errors. Provision also exists for the coder to record his uncertainty (?) if he is not sure that an error has occurred.

V. Don't know (?) is coded if the teacher-pupil communication is inaudible to the coder and the coder is unable to determine which of the above four types of teacher afforded contacts is occurring.

D. Student Initiated Dyadic Teacher-Pupil Contacts (referred to as Child Created Contacts on the coding sheets)

I. Child Created Contacts (Work-related)

This type of contact may relate to work content (CONT) or work procedures (PROC). The teacher's feedback to the child is also coded, whether the teacher offers praise (+) or criticism (-) and whether the contact is brief, long, or delayed (DELAY) by the teacher.

II. Child Created Contacts (Personal-related)

In this category there are two first-order divisions, experience (EXP) sharing and procedural (PROC). All experience sharing contacts are personal ones in which the student contacts the teacher to tell him something which is not related to either classroom work or procedure. The teacher's response is coded as either acknowledged (ACK) (i.e. the contact is acknowledged by the teacher) or delay (i.e. the teacher indicates she is unable to listen or talk to the pupil at that time).

A procedural contact occurs when the pupil is making a request, offers to do an errand, or reminds the teacher of something. The teacher's reaction is coded as grant or non-grant (N GRANT) (teacher has or has not granted the request) or as delay.

III. Don't Know

If the communication in the child created contact is inaudible to the coder, the don't know (?) column is used.

Section II

Definitions of One Modified Category and Two New Categories in the Expanded Brophy-Good Teacher-Pupil Dyadic Interaction Classroom Observation System

No Feedback Reaction (0)

This category of terminal teacher feedback in the Brophy-Good system has been restricted in meaning in this study. This part of the original statement now embodies its full meaning.

> "If the teacher makes no response whatsoever following the child's answer to the question, he is coded for no feedback reaction (0). This means that he makes no verbal response to the child and does not communicate affirmation or negation by shaking his head in response to the answer. Instead, he merely moves on to something else, perhaps by starting to make a new point or by asking another child a question. Most coders will be surprised to find that this category is used much more often than they had expected. It frequently happens that the teacher makes no feedback reaction at all to the child's answer, especially in fast moving question drills where he is pushing to get correct answers in an impersonal fashion, without paying attention to the individual child giving the answer" (Brophy & Good, 1970, p. 17).

Affirmative Teacher Reaction (AFFIRM)

This category of teacher reaction within an academic response opportunity is defined as a terminal teacher reaction which does not go beyond the level of simple affirmation. The teacher simply indicates that the child has given a correct response. He does not communicate a warm personal reaction to the child. There is merely an impersonal communication of information. For example, the teacher repeats the student's answer or thanks the pupil without explicit or implicit praise. The teacher's intent is to terminate student involvement.

Repeats Student Statement (REP SS)

This is an additional category in the set of teacher reactions in academic response opportunities described as sustaining. In this category are to be coded all those instances when the teacher repeats the child's answer in a quizzical manner without indicating whether he considers it to be correct or incorrect, or when the teacher restates the pupil answer for the purpose of having the student confirm what he had just said. The principal criterion to be used in distinguishing a Repeats Student Statement is whether the teacher's intention was to sustain the student's involvement by having the pupil clarify for himself and/or for others the meaning of his previous response.

APPENDIX B

HIGH INFERENCE RATING SCALES

High Inference Rating Scales

Withitness

1. The teacher makes frequent errors in attempting to deal with deviant behavior. She may over react to a situation, may react late or not at all (*timing*), may be off target in her reprimands and/or may desist a less serious deviancy while overlooking a more serious deviancy.

2. Between 1 and 2.

3. The teacher sometimes makes errors in attempting to deal with deviant behavior, i.e., *over react, timing, target and minor-major deviancy*, and sometimes makes no errors in desist attempts.

4. Between 3 and 5.

5. The teacher makes few of the above errors in attempting to deal with deviant behavior.

Smoothness

1. The teacher frequently acts in a manner which interferes with the ongoing *flow* of *academic* events. Actions of the teacher are not goal-oriented. She may pay attention to irrelevant or undue attention to intrusive details (*stimulus-boundedness*). She may *burst in* on children's activities with an order, statement or question (*thrusts*). She may shift back and forth from one activity to another and back again leaving things *hanging in mid-air (dangles and truncations)*.

2. Between 1 and 3.

3. The teacher sometimes acts in a manner which interferes with the ongoing *flow* of *academic* events. Actions of the teacher are sometimes goal-oriented and sometimes are not, i.e., some *stimulus-boundedness, thrusts, dangles and truncations* are evident.

4. Between 3 and 5.

5. The teacher rarely exhibits the above interfering behaviors.

Overlappingness

1. The teacher almost always attends to only *one* issue at a time. She either remains immersed in one issue or drops it and goes *all out* for another. For example, the teacher, while working with one group, ignores deviant behavior in another group, or ignores intruding children from another group, or goes all out and becomes immersed in the deviance or intrusion.

2. Between 1 and 3.

3. The teacher sometimes attends to more than one issue at a time.

4. Between 3 and 5.

5. The teacher almost always attends to more than one issue at a time. She, while working with one group, is able to deal with deviance and intrusions, verbally and nonverbally.

Momentum

1. Teacher behaviors frequently *slow down* the pace of the lesson inappropriately. This is done by *overdwelling* on pupil behavior, a subpoint rather than a main point, physical props rather than substance, and on instructions or details to the point of boredom. It is also slowed down by *fragmentation*, i.e., dealing with pupils one at a time when it is appropriate and more efficient to deal with them as a group, or dealing with props one at a time rather than en masse.

2. Between 1 and 3.

3. Teacher behaviors sometimes *slow down* the pace of the lesson by *overdwelling* and *fragmentation*.

4. Between 3 and 5.

5. Teacher behaviors rarely *slow down* the pace of the lesson by *overdwelling* or *fragmentation*.

Persuasiveness (Teacher's Ability to Motivate)

1. The teacher is the kind of person that communicates a socially weak and uninfluential person. She is frequently unable to get students to do work related to the objectives of the lesson.

2. Between 1 and 3.

3. The teacher is the kind of person that communicates an average persuasively powerful person. She is sometimes able to motivate students to work and sometimes unable to do so.

4. Between 3 and 5.

5. The teacher is the kind of person that communicates a socially influential or persuasively powerful person. She is almost always able to get students to do the work related to the objectives of the lesson.

   NOTE: This level does not imply that the teacher has chosen all the *goals* or *objectives* for the student.

Clarity

1. The teacher, when giving instructions, answering questions or explaining material to the class, is unclear in her presentations. The presentations may be too complex, ambiguous, or make use of unfamiliar or unrelated concepts and terms. Answers given are not specific but are vague or evasive. The teacher uses qualifiers (e.g. maybe, sometimes, it could be, etc.) excessively. The teacher rarely gives appropriate examples, uses illustrations, states objectives, summarizes, or checks for student understanding.

2. Between 1 and 3.

3. The teacher when giving instructions, answering questions or explaining material to the class, is sometimes clear and sometimes unclear in her presentations.

4. Between 3 and 5.

5. The teacher when giving instructions, answering questions or explaining material to the class, is clear in her presentation. Adequate use of examples and illustrations are made, objectives are clearly stated, main points are summarized, and adequate checks of student understanding are made.

Warmth[1]

1. The teacher gives *explicit* evidence of *rejection* of the student, his ideas, experiences, opinions or feelings. Criticism is harsh and gives *explicit* evidence of a negative feeling for the student expressed by the teacher.

2. The teacher is mechanical and/or passive in her responses. Mild criticism, a lack of concern or ignoring, provide implicit evidence of disinterest in the student.

3. The teacher provides no explicit or implicit evidence of dislike or rejection of the student. She does not criticize nor is there a clear expression of warmth, i.e. there is interest shown but not warmth.

4. The teacher *accepts, allows* pupil ideas, experiences, opinions, and feelings. There is implicit evidence of warmth and respect through praise and encouragement.

5. The teacher gives *explicit* evidence of a deep caring, prizing, and valuing of the student, and this is made clear to the student. Expectations of the student's highest and best is pressed for, indicating a deep respect. Voice tone and manner give evidence of a close relationship.

[1] Adapted from scales authored by C. B. Truax.

Empathy[1]

1. The verbal and behavioral expressions of the first person either do not attend to, or detract significantly from, the verbal and behavioral expressions of the second person in that they communicate significantly less of the second person's feelings than the second person has communicated himself.

2. While the first person responds to the expressed feelings of the second person, he does so in such a way that he subtracts noticeable affect from the communications of the second person.

3. The expressions of the first person in response to the expressed feelings of the second person are essentially interchangeable with those of the second person in that they express essentially the same affect and meaning.

4. The responses of the first person add noticeably to the expressions of the second person in such a way as to express himself.

5. The first person's responses add significantly to the feeling and meaning of the expressions of the second person in such a way as to (1) accurately express feeling levels below what the person himself was able to express or (2) in the event of ongoing deep self-exploration on the second person's part, to be fully with him in his deepest moments.

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[1] Carkhuff Revisions of the Truax Scales.

APPENDIX C

DESCRIPTIONS OF BELIEF SYSTEMS (THIS I BELIEVE TEST)

DESCRIPTIONS OF BELIEF SYSTEMS (THIS I BELIEVE TEST)

System 1: Characterized, according to theoretical notions, by a strong need for structure; rigid adherence to rules, authorities, and values which provide structure; and rejection of environmental inputs which are dissonant with the individual's organized modes of interpretation.

TIB responses tend to be stated in a definite, hard-and-fast manner, showing little doubt in the subject's mind about how he feels. The content shows adherence to norms and practices approved by society or prestige authorities, a negative reaction to rule-breaking, and polarized evaluations. Heavy reliance on authority is demonstrated by highly favorable attitudes toward religion, law, parents, friends. Other people must meet rigid standards of acceptability, operating in terms of the general behavioral principles of the subject. Religion is a highly consistent concern, serving as a base for the belief system in all aspects of life in many cases. This referent tends to elicit the most clear-cut System 1 responses of all the referents.

System 1's often demonstrate strong ingroup-outgroup feelings, expressed by intense hostility and negative feelings on the content of some referents. In order to avoid confusion with System 2 responses that appear similar because of their negativity, it is necessary to evaluate such responses within the total context of all the responses.

The overall impression of System 1's is that of a person who has definite stands on every topic, states them evaluatively and unequivocally, and rejects things if they do not meet his high standards or ideals of perfection. The reader may feel that this subject is rather hostile toward his environment and other people, but there is an underlying sense of stable acceptance of things as they should (ought, must, etc.) be by his standards. The words, "everything", "all", "completely", "best", "worst", etc., are all words that indicate the extreme, clear-cut, definite aspects of existence as this person sees it. Uncertainty is anathema to a System 1, and both content and structure in his responses demonstrate his drive to reject uncertainty and to find and maintain certainty in his environment.

System 2: Characterized by terms highly similar to those of System 1 except for a reversal of certain central aspects of content. The structural aspects are similar, and the responses indicate rigidity, simplicity, consistency, and exclusivity.

This subject has the same drive for certainty as the System 1, but seems unable to rely on his world to find it. Hence, he seems to obtain uncertainty by rejecting his world, as though negating it provides his only source of certainty. The reader will find a rejection of, or hostile attitude toward, authority referents, idealistic notions, most American standards and values, and most other people. Not all people are rejected, however, since this subject makes positive statements about the underdog, the loner, minority groups, and individuality. Conversely, he makes negative statements about elements that might do harm to these people and attributes.

There is a strong rejection of religion, people, government, and, more subtly, ties and obligations, and other freedom-restraining devices. This subject reacts negatively to these ideas, yet cannot ignore them. He speaks of the importance of close friendship, but suspects most people who seem to offer it. He tends to be factual and hard-nosed rather than idealistic about the world, requiring a need for structure similar to that observed in the System I person.

Overall, the System 2 person appears extremely hostile and rejecting, concrete-minded, non-analytic toward his environment, and a categorical acceptor or rejector in terms of pre-established negativity. His responses may be quite novel, but often they are inappropriately so and thus turn out to be more clever than creative.

System 3: The chief locus of satisfaction for a System 3 tends to be his relation with other people. His responses reflect the central importance of people, and he accepts and voices the values of the people with whom he is in contact at the moment rather than initiating behaviors or expressing beliefs that are contrary to the present group.

TIB responses generally lack any expression of negative feelings. There is a strong tendency to deal with the world through its superficial aspect, expressed in the use of clichés rather than directly. Relationships with people are brought in to the answers even when TIB referents do not necessarily call for them. Generally, the only negative reaction will be to a referent indicating harm or injury to other people.

The responses of these subjects are more complex, varied, and abstract than Systems 1 and 2. These people are typically rather sophisticated in dealing with their world and do not demonstrate a hard-and-fast rigidity in responses to the referents. Though the repeated emphasis on interpersonal relations may at first appear to be a rigid response tendency, analysis shows a great deal of flexibility and openness in the System 3's responses, while remaining sensitive to the evidence of person-oriented content. These individuals tend to manifest many distinctions in their thinking, but most of these are based on the *in-thing* and show little integration or synthesis.

The overall impression generated by the responses of System 3 persons is one of a positive attitude toward situations and ideals which are beneficial to people.

System 4: Characterized by relative independence from the environment, greater reliability on internally-derived stimulation, greater flexibility and openness, interest in (even seeking for) novelty, a relative lack of extreme evaluativeness or extreme acceptance-rejection behavior, the tendency to be aware of and to respond to referents in terms of multiple alternatives or interpretations.

TIB responses show a juxtaposition of diverse, often contrasting elements. There is a lack of one-way evaluativeness, certainty, and definiteness in commitment to a single way of perceiving a situation are typically not evident in these subjects.

The overall impression of a System 4 person is one of complexity of thought and feeling. Depth of connotative implications rather than superficial statement is most typical of these subjects. They tend to show novelty and appropriateness and to synthesize the many differentiations they make.

APPENDIX D

DESCRIPTION OF AUXILIARY DIMENSIONS (THIS I BELIEVE TEST)

DESCRIPTION OF AUXILIARY DIMENSIONS (THIS I BELIEVE TEST)

1. Openness - by which is meant the respondent's presumed willingness seriously to entertain and possibly accept an idea contrary to his own more central ones.

2. Candor - by which is meant the assumed forthrightness of self-honesty with which a response is made, which implies low denial and low defensiveness.

3. Evaluativeness - which refers to the tendency to make evaluative, good-bad, right-wrong judgments, with obviously pejorative implications.

4. Externality - which refers to the respondent's tendency to attribute success, failure, or control of his actions to forces over which he has little or no control, including such things as luck, other persons, God, social obstacles, etc.

5. Cynicism - which indicates an expression of nihilism, that nothing matters anyway, and, in general, that the world is a bunch of crap.

6. Optimism - which refers to an assumed feeling of well-being and in general that things either have or will turn out well for him.

7. Complexity - which has to do with the number of different themes expressed together with their integration, which, in essence, equals a kind of judged profundity or depth of thought.

APPENDIX E

PROCEDURES FOR STIMULATED RECALL SESSIONS

PROCEDURES FOR STIMULATED RECALL SESSIONS

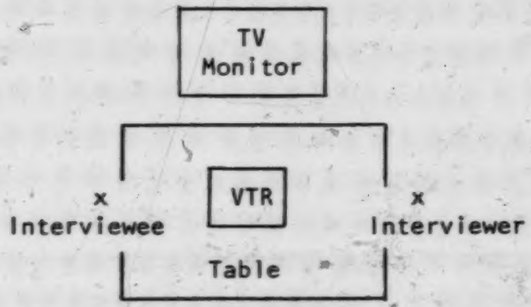
During the familiarization week in schools it will be necessary to discuss briefly with the teacher the nature of the 'stimulated recall' part of the research and the sequence of events relating to it so that the stimulated recall interview can follow as soon as possible after the lesson has been videotaped and previewed.

At the same time provide the teacher with a copy of Appendix A (Material to be Presented to, and Discussed with, the Interviewee) and ask him to read it carefully. Indicate also that you will be pleased to discuss any questions about stimulated recall and the above document prior to the start of the interview.

Just before the Interview

1. Preview the videotape of the teacher's lesson to identify those segments which appear most significant for investigating the interactive thought processes of teachers (see Appendix B). The total length of all segments for use in one interview should be no more than 30 minutes; 20 to 30 minutes of videotape would be adequate.

2. Prepare the interview setting as shown in the plan below.



(The main purpose in locating the furniture thus is to ensure that the interviewee can look directly at the monitor and will not be distracted by the interviewer.)

3. Encourage the teacher to become familiar with the operation of the VTR; have him operate the VTR and spend some time in viewing the videotape of the teacher's lesson. If the teacher has not viewed himself on videotape before, the interviewer might consider leaving the room and allowing the teacher to view the tape privately for a period. On no account should the interviewer discuss any aspect of the lesson in an evaluative way.

4. Set the VTR counter on zero at a point about 5 seconds before the start of the lesson.

5. Explain the purpose of the stimulated recall interview again and indicate clearly what is required of the teacher (see Appendix A). Stress that the role of the teacher is to recall the thoughts, feelings, and moment-to-moment reactions experienced during the lesson and to indicate when a conscious choice was made, the alternatives considered, and the reasons for choosing one course of action above all others.

6. Switch on the audiotape recorder, then the VTR unit. Record the time when the interview started.

During the Interview

7. Conduct the stimulated recall interview in accord with strategies outlined in Appendix B (Role of the Interviewer).

8. Record the actual segments of the videotape which were used for the purposes of the stimulated recall interview,
   e.g., 0 to 130
   270 to 390
   440 to 803.

9. Record the time when the interview ended.

After the Interview

10. Complete the form supplied, giving details of the stimulated recall interview, and place this with the audiotape and videotape used in this interview.

APPENDIX A

MATERIAL TO BE PRESENTED TO, AND DISCUSSED WITH, THE INTERVIEWEE

Goals of Research

At the present time very little is known about teachers' thought processes during instruction. These processes are the focus of interest of this research project. The goal of this research is to find out what information teachers use during instruction and how they process this information. Teacher decision making is of special interest.

It is considered that a study of these processes could yield insights which would assist in the development of theories of instruction and which would lead eventually to the improvement of teacher education programs and school curricula. How well the lesson was taught is NOT the focus of the interview.

Role of the Teacher/Interviewee

The method used in this research project to obtain data on teachers' information processing during instruction is called 'stimulated recall.' Asking teachers to recall after a lesson the thoughts and feelings they experienced while actually teaching the lesson has not proved very satisfactory. Recall of thoughts and feelings is facilitated when teachers are shown a videotape of the lesson. Seeing events in the lesson on videotape helps to trigger or stimulate recall—hence the term 'stimulated recall.'

Whereas it is possible to have people in some professions 'think out loud' about their professional duties because they are not interacting with other people, it is not possible to do this with teachers because it would interfere with the instructional process.

We know that the mind works faster than the voice. As teachers interact with children in the classroom they—

- become aware of many more classroom events than can be inferred from their verbal and nonverbal behavior;

- react to classroom events emotionally and intellectually in ways which even the most perceptive observer could not detect because they are internal—many reactions are not revealed to the observer;

- make numerous decisions about what to do and say next or at some future point in the lesson, or what not to do or say. The alternative courses of action considered, the reasons for the final choice of action are frequently not declared or revealed; the observer is not privileged with this 'inside' knowledge and with the various rationales.

As the teacher relives the lesson by viewing the videotape, he is invited to provide a detailed account, to talk aloud, about:

(a) thoughts, feelings, moment-to-moment reactions;

(b) conscious choices (i.e. when you chose to do or say one thing rather than other things, or when you chose to say or do nothing), the alternatives you considered before making a choice, and the reasons for choosing to do or say that particular thing.

Note: 1. You may stop and start the tape as often as you wish.

2. The interviewer may also stop the tape on some occasions to ask you if you can recall your thoughts, feelings, reactions etc., in relation to certain classroom events.

3. The interviewer's role is simply to assist you to recall what you thought and felt during the lesson.

4. As you view the tape you will probably form new impressions of the lesson and of events which occurred during the lesson, and think of other things that you might have said or done. Try to distinguish during the interview between the thoughts and feelings you had during the lesson and those you had after the lesson or when watching the videotape; ensure that the interviewer is aware of the distinctions too.

If you have any questions, the interviewer will be pleased to discuss these with you prior to the interview.

APPENDIX B

ROLE OF THE INTERVIEWER

In the stimulated recall session with teachers the role of the interviewer is to assist the teacher to recall and verbalize the covert thoughts and feelings he had during the lesson which has been videotaped.

It is important that what the teacher recalls about his covert thoughts and feelings during the lesson be as complete and as accurate as possible with no missing links or distortions. To achieve this goal it will be necessary for the interviewer to:

- try to establish a relaxed, friendly, supportive atmosphere prior to and during the interview;
- try to facilitate and encourage self-discovery; it is important for the interviewee to believe that he is capable of telling about inner processes without the interviewer telling the interviewee what they were;
- avoid making interpretations of, and judgments about, what appears on videotape; ask questions requiring elaboration or clarification but avoid questions answerable by 'yes' or 'no';
- assume a respectful set towards the teacher and the videotaped material; communicate to the interviewee that he is being taken very seriously;
- keep the teacher's attention focused on the TV image of self and class; refrain from unnecessary activity as such activity may actually interfere with recall;
- encourage the interviewee to talk; don't have him become so engrossed in listening to you that he forgets what he is reliving; the interviewee is the authority—you are his interested student;
- be patient; give the interviewee a chance to become involved in reliving the recorded lesson;
- immerse yourself in the interviewee's communication rather than trying to figure out what to say next;
- keep the teacher's discussion focused on what transpired in the actual videotaped lesson and, in particular, on the teacher's covert—
    - thoughts, feelings, and the sources of these;
    - conscious choices about what to say or do next or what not to do or say next;

the set of alternatives from which the choice was made and the reasons for making the actual choice;

- stop the tape (if the teacher has not already done so) at points in the lesson where it appears likely to be profitable for purposes of this research and at the following points identified during a preview of the videotape; (N.B. The meaning or definition of the points are as given in the Brophy and Evertson revision of the Brophy-Good Classroom Observation System.)

    1. When the teacher asks a non-volunteer to respond to a question.
    2. When a pupil's answer to a teacher's question is part-correct.
    3. When a pupil's answer to a teacher's question is incorrect.
    4. When a student-initiated question (relevant) occurs.
    5. When a student-initiated comment (relevant) occurs.
    6. When there is a behavior-related teacher-afforded warning.
    7. When there are non-verbal cues suggesting that the teacher is very pleased, enthusiastic, excited, agitated, perplexed, annoyed, etc.
    8. When the lesson is not proceeding satisfactorily, when it is not running smoothly.
    9. When students are disruptive, noisy.

- ask probing questions to facilitate maximum disclosure by the teacher, e.g.,

    What were you thinking, feeling at that point?
    Did you have any reasons for saying, doing . . .?
    What other alternatives were you considering?
    Was that a conscious reaction or reaction?
    What caused you to say, do . . .?
    Did you see or hear anything which prompted you to say, do . . .?
    Why did you say, do . . .?

  (Note: Questions should be brief and should create an intense awareness in the teacher of himself. Avoid questions which are suggestive of, or imply, criticism, incredulity, disagreement, disapproval, etc.)

- check frequently that the teacher is differentiating between interactive thoughts and feelings and those subsequently formed.

APPENDIX F

LETTER FROM DR. N. KAGAN

MICHIGAN STATE UNIVERSITY

COLLEGE OF EDUCATION · DEPARTMENT OF COUNSELING, PERSONNEL SERVICES AND EDUCATIONAL PSYCHOLOGY
EAST LANSING · MICHIGAN · 48824

September 22, 1976

P.W. Marland
Dept. of Elementary Education
543 Education Bldg.
University of Alberta
Edmonton, Alberta T6G 2G5
CANADA

Dear P.W. Marland:

I have carefully reviewed the material you sent me on August 28. You've done a fine job of translating the inquirer role into a format which would be more relevant for use with classroom teachers. A small criticism--I know in our earlier work we suggested the inquirer might stop the videotape from time to time and offer a list of places where the inquirer might do this so as not to become overly intrusive in the recall process. Recently I am more and more convinced that for what little is gained by having the inquirer stop the tape more is lost in that the inquiree loses some sense of control in being the ultimate interpreter of his/her own experience.

As for developing a list of inquirer leads appropriate for teacher recall, let me first suggest that you not dismiss too quickly the leads developed for use in helping relationships. To ask a teacher what s/he felt, thought the student felt, felt about the students and wanted the students to feel about him or her may be very influential in what the teacher actually did. The more clearly cognitive equivalent of these leads would be what were your strategies, how well did you think the students understood what you were saying, what did you want the students to think, what did you imagine they actually were thinking? Can you recall any tangential or irrelevant thoughts you had? Were there any fantasies going through your mind? Was there anything that you did not want to happen? Were there any things that you did not want the students to do, cognitively, with the materials at hand?

I think the above are a bit different from some of the leads you may have been using. May I also refer you to the enclosed paper by Elstein, et al.. I wonder, too, if you know of anyone in Edmonton who has the 1974 color film entitled, "Inquirer Role and Function." If so, you may want to preview it if you have not already done so.

I'm not sure if the above is what you wanted from me or not. Please react to the ideas and let's continue our dialogue.

Sincerely,

Norman Kagan

NK:jjp
Enclosure

APPENDIX G

PREINSTRUCTIONAL INTERVIEW

PREINSTRUCTIONAL INTERVIEW

Each teacher participating in the research project will be videotaped on two occasions each of approximately one hour's duration. A preinstructional interview is to be conducted with the teacher prior to each videotaping session. The preinstructional interview consists of two parts. The purpose of Part A is to have the teacher indicate the goals of the lesson or lessons to be taught during the videotaped session. (N.B. Each one-hour videotaped session may cover one or more lessons.) The purpose of Part B is to have the teacher indicate the plans he has made for achieving the lesson goals.

Conduct of the Interview

The purpose of the interview is to have the teacher reveal the nature of the actual lesson plan, written and/or unwritten, that he has developed prior to instruction. The role of the interviewer is to facilitate a full disclosure by the teacher of details of the lesson plan without omission, addition, or distortion. It is imperative that the interviewer ensures that—

i. every opportunity is provided for the teacher to reveal as completely as possible all details of his plan;

ii. every precaution is taken against saying or doing anything in the interview which may influence the teacher to withhold, or change, details of lesson plans; even so, the very act of talking about the plans may cause the teacher to modify them.

To ensure that the goals of the interview will be achieved as fully as possible, these guidelines are to be followed by the interviewer:

- After the initial question (see attached) has been asked and responded to by the teacher, it will usually be necessary to ask 'follow-up' questions. The nature of the 'follow-up' questions should be largely dependent upon what the teacher says and should seek clarification of the teacher's previous responses or should invite the teacher to extend the previous responses.

- Avoid asking 'leading' questions viz., those which provide alternatives from which the teacher has only to choose or which involve mentioning other asepcts of planning to which the teacher may not have given consideration.

- Avoid asking questions which are based on inferences you may have made from the teacher's comments.

- When phrasing 'follow-up' questions, use the teacher's own words as much as possible; do not rephrase the teacher's comments in your own words.
- Be neutral; do not offer or express an opinion about the plans or goals even if asked; avoid making judgmental or evaluative comments.

PROCEDURES FOR CONDUCTING PREINSTRUCTIONAL INTERVIEW

Part A

1. Interviewer says:

   During the lesson we are videotaping today/tomorrow we shall be keeping a record of classroom events. To be able to place this record in its proper perspective it is necessary to know what your intentions are, what you are setting out to do in the lesson. In this interview you will be asked one question about the goals of the lesson you are about to teach. Please answer the question as fully as possible but do not say anything in your response to this question which you had not thought about prior to this interview.

2. Record the following details on the form supplied which is to be kept with the tape:

   Name of teacher
   Name of school
   Grade
   Lesson topic(s)
   Date when lesson is to be taught.

Turn on the audio-tape recorder at this point.

3. Ask the 'initial' question:

   What are the goals of this lesson/unit of work?

4. Ask 'follow-up' questions to ensure that the goals of the interview are achieved.

   Examples: Can you explain more fully what you meant by "   "?
   What other goals do you hope to achieve in this lesson?
   Do you have anything more you want to say about the goals of the lesson? (This question should be repeated until the teacher answers in the negative.)

Part B

5. Interviewer says:

Now I would like to move on to the second part of the interview. At this point you will be asked about the plans you have made for achieving the goals of the lesson you outlined earlier. The plans may be in written form or they may be in unwritten form—you may have thought out what you were going to do in the lesson without committing yourself to paper. In this interview please indicate the nature of the plans you have made for achieving the goals of the lesson whether they are in written or unwritten form. Answer the question as fully as possible but do not say anything in your response which you had not thought about prior to this interview.

6. Ask the 'initial' question:

How do you intend to achieve the goals of the lesson?

7. Ask 'follow-up' questions to ensure that the goals of the interview are achieved.

Examples: Did you plan to do anything else?
Were there any other aspects of the lesson that you had given thought to?
How had you planned to do that?
Have you anything more to say about the plans you had made for achieving the goals of the lesson? (This question should be repeated until the teacher answers in the negative.)

8. Then ask:

Did you mention anything in your answers to the questions which you hadn't thought of before the interview?

Do you think that discussing your plans in this interview changed them in any way? If so, how?

APPENDIX H

INTERCODER RELIABILITY MEASURES OBTAINED DURING TRAINING WITH THE LOW INFERENCE CLASSROOM OBSERVATION SYSTEM

Intercoder Reliability Measures Obtained During Training with the
Low Inference Classroom Observation System

Variable	Percentage Agreement														
	Coders 1 & 2					Coders 1 & 3					Coders 2 & 3				
Check No.	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Academic Response Opportunity															
Type of Respondent	82	$\underline{100}$[*]	$\underline{70}$	--[†]	--	82	$\underline{70}$	$\underline{55}$	--	--	80	$\underline{70}$	$\underline{78}$	--	--
Question Type	73	$\underline{75}$	$\underline{71}$	--	--	36	$\underline{100}$	$\underline{33}$	--	--	30	$\underline{75}$	$\underline{33}$	--	--
Child Answer	85	$\underline{80}$	$\underline{64}$	--	--	69	$\underline{89}$	$\underline{58}$	--	--	64	$\underline{80}$	$\underline{78}$	--	--
T. Feedback on PCSS, PROD, CHOIS	43	$\underline{67}$	$\underline{50}$	--	--	60	$\underline{78}$	$\underline{71}$	--	--	60	$\underline{67}$	$\underline{78}$	--	--
T. Feedback on Opinion Q's	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Student Initiated Question															
Type	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Relevancy	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T. Feedback	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Student Initiated Comment															
Type	$\underline{100}$	--	--	--	--	$\underline{66}$	--	--	--	--	$\underline{66}$	--	--	--	--
Relevancy	$\underline{100}$	--	--	--	--	$\underline{66}$	--	--	--	--	$\underline{66}$	--	--	--	--
T. Feedback	$\underline{66}$	--	--	--	--	$\underline{66}$	--	--	--	--	$\underline{66}$	--	--	--	--
Dyadic Contact															
Type	$\underline{100}$	--	--	65	86	$\underline{64}$	--	--	76	92	$\underline{64}$	--	--	84	92
Child Created Contact (CCC)															
Type	$\underline{100}$	--	--	90	83	$\underline{0}$	--	--	87	95	$\underline{0}$	--	--	96	79
CCC (WK-REL)															
T. Reaction (DELAY, BRIEF, LONG)	$\underline{100}$	--	--	79	86	$\underline{0}$	--	--	100	88	$\underline{0}$	--	--	79	78
T. Reaction (‡, ⁻)	--	--	--	--	$\underline{56}$	--	--	--	--	$\underline{45}$	--	--	--	--	$\underline{78}$
CCC (PERS-REL)															
Type	--	--	--	$\underline{25}$	$\underline{50}$	--	--	--	$\underline{43}$	$\underline{50}$	--	--	--	$\underline{50}$	$\underline{75}$
T. Reaction (ACK, DELAY)	--	--	--	--	$\underline{0}$	--	--	--	--	$\underline{100}$	--	--	--	--	$\underline{0}$
T. Reaction (GRANT, NONGRANT)	--	--	--	$\underline{25}$	$\underline{33}$	--	--	--	$\underline{43}$	$\underline{0}$	--	--	--	$\underline{50}$	$\underline{0}$
Teacher Afforded Contact (TAC)															
Type	$\underline{89}$	--	--	45	$\underline{73}$	$\underline{58}$	--	--	60	$\underline{92}$	$\underline{57}$	--	--	71	$\underline{73}$
TAC (WK-REL)															
Type (OBSV, BRIEF, LONG)	--	--	--	31	$\underline{60}$	--	--	--	32	$\underline{50}$	--	--	--	59	$\underline{67}$
T. Reaction (‡, ⁻)	--	--	--	33	--	--	--	--	33	--	--	--	--	100	--
TAC (PROC-REL)															
Type (MANAG, FAVOR)	$\underline{78}$	--	--	$\underline{56}$	$\underline{33}$	$\underline{78}$	--	--	$\underline{78}$	$\underline{100}$	$\underline{100}$	--	--	$\underline{45}$	$\underline{33}$
TAC (BEH-REL)															
Type (‡, NVI, WARN, ⁻)	$\underline{0}$	--	--	$\underline{67}$	$\underline{60}$	$\underline{20}$	--	--	$\underline{57}$	$\underline{50}$	$\underline{0}$	--	--	$\underline{71}$	$\underline{33}$
Error Type	$\underline{0}$	--	--	$\underline{67}$	$\underline{60}$	$\underline{20}$	--	--	$\underline{57}$	$\underline{50}$	$\underline{0}$	--	--	$\underline{71}$	$\underline{33}$

---

[*] Percentage agreements which are underlined indicate calculations based on frequencies of less than 10 for a given event.

[†] A dash in a cell represents 100% agreement between coders that the event did not occur.

APPENDIX I

INTERCODER RELIABILITY MEASURES OBTAINED DURING DATA COLLECTION WITH THE LOW INFERENCE CLASSROOM OBSERVATION SYSTEM

Intercoder Reliability Measures Obtained during Data Collection with the Low Inference Classroom Observation System

	Percentage Agreement												
	Coders 1 & 2			Coders 1 & 3						Coders 2 & 3			
Variable Check No.	1	2	3	1	2	3	4	5	6	1	2	3	4
Academic Response Opportunity													
Type of Respondent	50*	85	--†	20	50	33	79	0	--	50	91	71	--
Question Type	88	86	--	33	55	50	83	33	--	77	89	82	33
Child Answer	50	85	--	33	52	33	89	100	--	50	90	75	--
T. Feedback on PCSS, PROD, CHOIS	50	73	--	25	66	33	74	100	--	39	76	69	--
T. Feedback on Opinion Q's	--	--	--	0	18	100	100	--	--	--	60	--	--
Student Initiated Question													
Type	72	--	--	--	50	0	57	100	43	33	--	--	40
Relevancy	72	--	--	--	50	33	71	50	60	33	--	--	60
T. Feedback	63	--	--	--	50	33	71	100	29	33	--	--	60
Student Initiated Comment													
Type	33	0	100	67	50	50	42	71	40	43	40	20	50
Relevancy	45	0	100	50	50	29	56	75	60	71	80	100	44
T. Feedback	56	0	100	33	--	27	13	57	100	71	60	60	44
Dyadic Contact													
Type	84	100	73	67	20	56	85	88	83	73	56	83	89
Child Created Contact (CCC)													
Type	62	--	69	100	0	39	40	81	80	100	0	100	80
CCC (WK-REL)													
T. Reaction (DELAY, BRIEF, LONG)	56	--	41	75	--	29	50	79	67	0	0	100	71
T. Reaction (‡, ∓)	--	--	--	--	--	100	--	--	0	--	--	--	--
CCC (PERS-REL)													
Type	0	--	17	--	0	20	0	58	38	0	--	100	50
T. Reaction (ACK, DELAY)	--	--	0	--	0	20	--	33	33	0	--	--	0
T. Reaction (GRANT, NONGRANT)	0	--	20	--	--	--	0	33	--	0	--	100	20
Teacher Afforded Contact (TAC)													
Type	76	100	74	59	22	42	77	90	55	67	43	80	85
TAC (WK-REL)													
Type (OBSV, BRIEF, LONG)	46	--	33	25	--	--	67	83	50	--	--	60	40
T. Reaction (‡, ∓)	--	--	--	0	--	--	--	43	60	--	--	--	100
TAC (PROC-REL)													
Type (MANAG, FAVOR)	56	--	50	60	22	33	100	88	20	100	0	100	89
TAC (BEH-REL)													
Type (‡, NVI, WARN, ∓)	0	100	0	20	0	40	50	50	50	0	57	50	50
Error Type	0	100	0	60	--	33	50	78	50	0	45	100	50

*Percentage agreements which are underlined indicate calculations based on frequencies of less than 10 for a given event.

†A dash in a cell represents 100% agreement between coders that the event did not occur.

APPENDIX J

SYSTEM FOR THE ANALYSIS OF TEACHERS' INTERACTIVE THOUGHTS

Contents

Page

Introduction 1

Data 1

Coding 2

  Step I: Identification of Interactive Data 2

    Guidelines 4

  Step II: Unitization 10

    The Unit 10

    Categories 12

      Perceptions 13

      Interpretations 14

      Tactical Deliberations (Prospective) 15

      Tactical Deliberations (Retrospective) 16

      Reflections 16

      Anticipations 18

      Information Categories 20

        Information—Pupil 20

        Information—Other 21

      Goal Statements 22

      Fantasies 23

      Feelings 24

    Brief Description of Categories in SATIT 26

System for the Analysis of Teachers' Interactive Thoughts (SATIT)

Introduction

This system (SATIT) has been developed to provide a basis for the further analysis of the interactive cognitive functioning of teachers, that is, the thoughts and feelings of teachers during instruction. It is generally agreed that the information that teachers process during instruction has a direct bearing or influence on their subsequent instructional behavior, hence an analysis of that information and the ways in which it is used or processed could yield clues vital to gaining a better understanding of teaching and ways of promoting effective teaching.

Data

The data to be coded by SATIT are in transcript form, the transcripts having been prepared from audio-tapes of interviews with teachers. The interview data were obtained using the *stimulated recall* technique, a branch of introspective methodology. This involves showing the teacher a videotape replay of a lesson just completed. The teacher, as he views the videotape of the lesson, is required to report, in as much detail as possible, the thoughts and feelings he had during the lesson. An interviewer is also present while the videotape of the lesson is being replayed to facilitate recall and full disclosure by the teacher of his interactive thoughts and feelings. At the points where the teacher begins to talk about his interactive thoughts and feelings, the videotape is stopped. When the conversation stops, the videotape replay of the lesson recommences. Thus the interview data are comprised of natural segments, each segment containing the dialogue between teacher (T) and interviewer (I) about one point in the videotaped lesson. In the interview data (also referred to as stimulated recall protocols), the end of each segment is indicated by a broken line (- - - -) on the left side of the page.

Not unexpectedly, the stimulated recall procedure yielded more than just the teacher's interactive thoughts. Besides interactive data, the stimulated recall protocols sometimes include—

- thoughts and feelings which the teacher had after the lesson or when viewing the videotape of the lesson (post-active data);
- references by the teacher to pre-lesson plans or thoughts (preactive data);
- discourse during which the teacher sets out to describe or provide a rationale for his classroom behavior;
- discourse during which the teacher is attempting to clarify or provide a background for enabling the interviewer to better understand the interactive data.

Coding

Step I: Identification of Interactive Data

The first step in using this system is to distinguish the interactive from the non-interactive (preactive, postactive) data. The task is to pick out those parts of the protocols which are about teacher interactive thoughts and feelings. Our concern therefore is only with that part of the dialogue spoken by teachers.

Prior to the stimulated recall interview, the teacher was asked to take care to distinguish during the interview between interactive and non-interactive thoughts, and to advise the interviewer when non-interactive thoughts and feelings were being recounted. The interviewers were likewise asked to check with the teachers when in doubt about whether the teacher was discussing interactive or non-interactive thoughts and feelings. As a result the stimulated recall protocols will contain instances when the teachers declare, or are asked to declare, whether the thoughts they are verbalizing are interactive in nature or not.

The interview protocols contain, therefore, many clues which make it easy to discriminate the interactive from the non-interactive data. Here are some examples of the kinds of clues which denote interactive data.

- T: I was thinking [at that time] . . .
- T: [At that point in the lesson] I thought . . .
- I: You remember feeling that at that particular time?
  (I was referring to something the T said earlier.)
  T: [Right.]
- I: [Were you having any thoughts at that time?]
  T: That Tommy and Marnie really annoyed me.

Similarly there are many clues which give clear indications of when the teacher is talking about non-interactive thoughts and feelings. Here are some:

- T: I'm thinking [now] (i.e. as I watch the videotape) . . .
- T: [As we're watching here] I can see . . .
- I: Were you thinking that then? (I is referring to some

thoughts T expressed earlier.)

T: [No.]

I: Do you ever get tired of listening to their stories?

T: Yes, sometimes I do [but not in that lesson].

Guidelines

At other times the signs which assist coders to distinguish between interactive and non-interactive data are less clear or are not present at all. Where this is the case, the following guidelines should be used: (N.B. In the examples, those sections which are interactive data have been underlined.)

Guideline 1

Label as *non-interactive* those sections of the protocols in which the teacher is describing or recalling what he was saying or doing, or what he had said or done, rather than what he was thinking.

Examples:

- T: At that moment I kind of smiled to myself.
- T: Then I said, "Just hold it a second."
- T: I'm talking to Mary there.
- T: I'm not trying to be noble or anything. I was just indicating the value I place on that kind of interaction.
- T: I know now what I was thinking and feeling at the time.

Note 1. Statements indicating that the teacher saw, heard, or sensed what a student was saying or doing, appear in the protocols. These statements are to be coded as interactive since it is clear that the teacher was consciously monitoring or processing pupil behavior during that part of the lesson.

Examples:

- T: I heard him give the answer.*
- T: As I talked, he kept on looking under his desk.* I remember that.

Note 2. Extreme care has to be taken when coding descriptive passages because a description by the teacher of what he was doing may also contain reference to a plan of action or tactic that the teacher was considering during the lesson. Usually, when descriptive passages in the stimulated recall-protocols give accounts of interactive thoughts, they contain references to reasons, purposes, intents, results and consequences.

Examples:

- T: I chose to do it that way because I doubted that they would understand the other method.*
- T: I could tell they were inattentive so I just stopped and waited.*

Guideline 2

Label as *non-interactive* those sections of the protocols in which the teacher is showing awareness of what she was doing rather than of what she was thinking.

Example:

- T: I was conscious of turning to Billy.

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* Interactive.

Guideline 3

Label as *non-interactive* those sections of the protocols in which the teacher is engaged in general discussion about teaching, situations in teaching that sometimes arose or have arisen, and techniques that should or should not be used, where it is apparent that the discussion is not related to the interactive thoughts of the teacher. Often, when the teacher is engaged in this kind of discussion, it is an *aside*. It may be initiated by the interviewer who may ask what the teacher would normally do, think, or believe in a similar situation. On other occasions it is initiated by the teacher who discusses what he would do, say, or think in similar situations.

Examples:

• T: Quite often when a decision is all one way everybody is happy, but if half the people want it and the other half don't, then a good half will be unhappy.

• I: What would you do there?

T: Usually I think, "Okay, ask the first person."

• T: You know how you often think, "I'll ask this question, and I expect this answer."

• I: You don't like to give answers?

T: No I don't, not at all. I think that they'll remember them a little better and it will be a little easier for them the next time if they find out these things for themselves.

• T: You asked me earlier how I show my displeasure or control things. Although they don't always work, sometimes I pause and wait.

Guideline 4

Label as *non-interactive* those sections of the protocols in which it appears the teacher is providing a reason, explanation, or rationale for what he was doing or saying, to justify or explain that behavior to the interviewer, or where he is reflecting on the meaning of what he had said or done.

Examples:

- T: I didn't mean it as a punishment, just a relaxing thing.
- T: I wasn't trying to brow-beat her and she was just as happy afterwards.
- T: That was a 'put-on' when I said that.

Guideline 5

Label as *non-interactive* those portions of the protocols in which it appears the teacher is providing an illustration or example of an interactive thought to make the meaning clearer to the interviewer.

Example:

- T: I have a feeling that it establishes a greater bond. If I go, "_____, how are you really feeling?" and put my hand on your arm, I think it does.

Guideline 6

Label as *non-interactive* those sections of the protocols in which the teacher summarizes, restates, reviews what he or the interviewer said previously in the stimulated recall protocols.

Examples:

- T: I was trying to figure out how I should answer.*

  I: So at that time you were thinking about how to respond to the boy?

  T: At that time I was wondering what I should say.

- T: I saw two hands go up and one come down*—that sort of thing. To me this meant that cliques had formed.* I didn't realize how cliquey things had got until I saw hands going up and down.

Note: Occasionally when the teacher is repetitive, the original statement is elaborated and clarified. When this happens, include the more specific statement in the interactive data but omit the other one.

Guideline 7

Label as *non-interactive* those sections of the protocols where the teacher's consideration of a pre-instructional plan, decision, or state of mind did not occur during the lesson. If the reference was made during the interactive phase, that part of the protocols which contains the reference would be regarded as interactive.

Examples:

- T: I thought it would be kind of a nice way to start the day, especially talking about 'on the way to school' types of things.

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*Interactive data.

- I: I thought you had wanted to begin by discussing fires.

  T: Well initially I did. I wanted to begin by discussing fires in general.

Guideline 8

Label as *non-interactive* those portions of the protocols where the teacher indicates any uncertainty about thoughts and feelings being interactive.

Examples:

- T: I don't know whether I was noticing how inattentive they were or not.
- T: I simply can't remember if I was thinking then that she should have given a much better answer to that question.

Guideline 9

When attempting to classify parts of the protocols as interactive or non-interactive, look for contextual clues. The segment may contain more than one reference to the same point. Frequently, clues about the nature of portions of the data are found several lines prior, or subsequent, to the section under scrutiny.

Guideline 10

When in doubt, designate the portion in question as non-interactive.

Coding

Step II: Unitization

The second phase in the use of a coding system normally involves a two-stage process. First the protocols are divided up into units for example, a paragraph, a line, an exchange, or a sentence. This procedure is called unitization or segmentation. The second stage is the categorization stage when each unit is assigned to one of several discrete, clearly defined categories.

In SATIT, the distinction between the two stages of segmentation and categorization is blurred because the unit selected is best understood in terms of the categories. In fact the categories largely establish the unit. The procedure adopted in this system, not an uncommon one, is to scrutinize the protocols for sections or portions which have the same characteristics as one of the categories of interactive thoughts. Once a segment of discourse has been matched with the characteristics of a category, then the unit has also been established.

The Unit

The unit in SATIT could be loosely termed a *thought* or ideational unit, a relatively crude unit defined as that portion of the protocols which is centered on a single thought.

It can be further defined in terms of the application of certain kinds of cognitive processes to classroom personalities, events, objects, ideas, and other subjective and substantive materials. Some examples of the basic elements of which units are comprised are indicated below. (An element can be thought of in terms of the application of a cognitive process to an item.)

	Process		Item
a	evaluating	→	answer
b	choosing	→	respondent
c	recalling	→	fact
d	noticing	→	facial expression
e	experiencing	→	emotion
f	anticipating	→	outcome
g	hearing	→	statement

In the stimulated recall protocols the units do not, of course, appear in this form but in an elaborated dialogic form. Elements similar to those above can be identified within naturally occurring units. Here are some units which correspond to the basic elements appearing above.

a T: Right then I thought, "Geez, that's a terrific answer."

b T: At that point in the discussion I was considering asking someone who hadn't answered any questions for a while.

c T: I can remember thinking, "I know they call the thing that is near the front of the train a cowcatcher."

d T: I saw the look on her face at that instant.

e T: I wasn't very pleased about it.

f1 T: Just then my anticipation was that Shirley would be able to answer my question.

f2 I: At that point were you anticipating that Shirley would be able to give you the correct answer?

T: Yes.

g T: When I heard that question . . .

An analysis of the above units will show that they are reducible to the basic elements given earlier. It also becomes obvious that a unit may be co-terminous with a simple sentence (as in d), a dependent clause (as in g), a complex sentence consisting of a principal and one or more dependent clauses (as in a, b, c, f1), and a word (as in f2), where the teacher's affirmative reply indicates that he was anticipating a particular outcome. These grammatical structures don't exhaust the variety of forms that a unit may take.

Categories

A category is a set of units with one or more distinct features. The categories are discrete so that no unit may be placed in more than one category.

Eleven categories of interactive thoughts have been constructed—

Perceptions
Interpretations
Tactical deliberations (prospective)
Tactical deliberations (retrospective)
Reflections
Anticipations
Information—pupil
Information—other
Goal statements

Fantasies

Feelings

In the subsequent pages each category is defined and examples of units pertaining to it are provided. A summary of these definitions, expressed in terms of the basic elements discussed on page 11, is provided at the end of this manual.

1. Perceptions

A perception is the unit in which the teacher reports a sensory experience, what he saw, heard, noticed, felt (in a physical way), or smelt, during the lesson. A perception represents awareness, a basic or first level in cognition. The targets of the sensory modalities include students, self, events, interactions, non-verbal behaviors, resources, and other features of classroom life.

Examples (see parts in brackets):

- T: (I noticed that Jill and Tom were exchanging books.)
- T: (I was aware that his hand was raised.)
- T: (The second time round only two put their hands up.)
- I: Did you hear something that caused you to walk to that corner of the room?

  T: (Giggling.)
- T: (As soon as I heard, "I'm finished), I thought, "Okay. Now the fun is going to start."
- T: (The book had disappeared.)
- T: (I noticed that I had only 5 minutes left before recess.)

2. Interpretations

On many occasions, once the teacher has become aware of (i.e. has perceived) something, he begins to interpret the perception or give it personal meaning. Interpreting is defined as the process of attaching meaning or an explanation to a perception. An interpretation is defined as an inference that the teacher makes about his perception of a pupil. It is based on a perception of a pupil or pupils and often involves his attributing some quality, characteristic, mental process, or state of mind to the pupil.

An interpretation is distinguishable from a perception by virtue of its abstractness. A perception usually concerns something audible or visible whereas an interpretation is a mental abstraction, neither visible nor audible, but discussable.

The meaning a teacher attaches to a perception of a pupil is often closely related to the teacher's subjective knowledge of the pupil.

Interpretations often appear in the protocols without the perceptions having been mentioned by the teacher though of course they are implied.

Examples (see parts in brackets):

- T. I was surprised (that he now has a positive attitude to writing). [T had just heard the pupil ask, "Aren't we going to do writing first?"]
- T: The looks on their faces told me that (they were starting to pick up on what he was saying).
- T: One hand would go down and then two more would go down.

(I was conscious that there was a little bit of pressure in the voting.)

- T: At that point I was starting to feel happier about the lesson. (They were beginning to understand what I was saying.)
- T: She had that look on her. (I knew she was puzzled.)
- T: (I knew he wasn't thinking.) I could just tell.

3. Tactical Deliberations (Prospective)

In this category are to be placed all units in which the teacher is thinking about the course or courses of action that he might follow at some future point in this or another lesson. This would include instances when the teacher identifies or lists courses of action, and instances when the teacher thinks about the courses of action in some way. The subject of a tactical deliberation (prospective) will always be what the teacher could or might do—a move, a tactic, a course of action that the teacher could use at a subsequent point in the lesson.

Examples (see parts in brackets):

- T: (I could see that there wasn't much I could do about Steven there.)
- T: (I was also thinking that I couldn't ask them to come down to the carpet one group at a time.)
- T: (Then I thought that I'd play the tape again.)
- T: (I was thinking that they needed some sort of positive reinforcement.)
- T: I thought that I'd try again to make the directions clear.)

4. Tactical Deliberations (Retrospective)

Occasionally the protocols will include a comment or report on a move, tactic, or course of action which the teacher has already used in the lesson. These are to be coded as retrospective tactical deliberations. For the most part, a retrospective tactical deliberation will be coded when the teacher comments on, or evaluates, something which he has already done. Retrospective tactical deliberations appear in brackets.

Examples (see parts in brackets):

- T: When I played the tape again, (I could see that I shouldn't have expected them to repeat all that had been said).
- T: I went over to him and told him to check the right answers. (That didn't seem to get any response.)
- T: (I should have been listening more carefully to what Dave was telling me.)
- T: (I thought after I explained it to her, "I didn't make that very clear.")
- T: When I saw their blank looks, (I realized that my instructions couldn't have been very clear).

5. Reflections

A reflection is very similar to a retrospective tactical deliberation in that both refer to past events in the lesson. The difference between the two lies in the focus or substance of the thought. A retrospective tactical deliberation has a singular focus on teacher activity, whereas reflections are about other lesson-relevant matters such as (i) experiences with aids, materials, and lesson content, (ii) characteristics of the lesson such as its phases, pace and degree of success, and (iii) pupil activity provided, of course, that the teacher is not discussing the meaning he attributes to the pupil behaviour. This would be coded as an interpretation.

The distinction between a reflection and an interpretation is sometimes difficult to make because both deal with teacher perceptions of pupils and pupil behaviour, though of course the subject matter of reflections is also much more extensive. The essential difference between an interpretation of a perception and a reflection about a perception is that the former is concerned with the meaning of a perception, the latter with other characteristics of the perception and/or its implicit meaning, for example, desirability, usefulness, acceptability, frequency, and value. Thoughts about student's written work are usually coded as reflections, unless the teacher is attributing to the pupil a quality, characteristic, mental process, or state of mind.

Another way which is sometimes helpful in distinguishing between an interpretation and a reflection is to consider whether the teacher is talking about the meaning (interpretation) of an act or its consequences or concomitants (reflections). An example may help to clarify this.

T: When I see Tim do that (viz., look away from the T) (PERCEPTION), I know he's frustrated. (INTERPRETATION)

T: When he's fidgety like that (PERCEPTION), he becomes a disturbing influence on others round him. (REFLECTION)

Examples (see parts in brackets):

- T: Up to the point where we had gone back to our seats, (the discussion had gone fairly well I thought).
- T: (They didn't respond as well as they sometimes do.)
- T: (I was thinking that especially for the kids that needed a bit of a challenge, it was good for them.)
- T: (The first question was a difficult question, I felt.)
- T: (I was beginning to think at that point in time that some of the words were quite a bit above them.)
- T: (I thought that other class's noise is rather disturbing) when they're trying to listen.

6. Anticipations

In essence, an anticipation is a speculative statement or a prediction about (i) what is likely to take place in the classroom, or (ii) the probable or likely consequences of an event which has taken place or which the teacher considers may or ought to take place. Anticipations are frequently found with prospective tactical deliberations, that is, where the teacher is considering some future courses of action. Identification of a future course of teacher action or alternative future courses of teacher action is not an anticipation of course but a prospective tactical deliberation though anticipations are often factors which shape or influence selection of a course of action.

Examples (see parts in brackets):

- T: (To show anger now would mean maybe a difficult day.)
- T: (I thought it may turn out to be a close vote). (Then

some of the children will say, "Well, I disagree.")

- T: If I'd decided, "We'll all do the listening activity," (some would have thought I was pushing).
- T: (I guess I was anticipating that this was something else that was going to slow us down.)
- T: I was also thinking, 'Tricia's kind of silly right now. (If I ask her I probably won't get a straight answer.)'
- T: (I was hoping that they would have the same feeling about the tape.)
- T: When I finally did go over (it was because I felt he was going to distract the rest).

Occasionally a teacher expresses the desire that one rather than another anticipated outcome or event will occur or he indicates what his preference or bias would be in such a situation.

Examples:

- T: (At that point I was hoping that the children would choose to do the listening activity rather than the others.)
- T: (I was hoping that the audio tape materials would present the class with something to do as quickly as possible.)

These preferred events and outcomes which the T suspects may happen are to be coded as anticipations.

Also when the teacher is engaging in retroactive tactical deliberations, he occasionally may anticipate what the outcome might have been of an alternative course of action that subsequently he thought he could or should have used.

Example:

- T: I should have stood out front and said, "What does that make you think of?" (Then they would have done a much better job.)

These are also to be regarded as anticipations.

Information Categories

In the interactive protocols teachers discussed or reported information which they brought to and used in the lesson. It is distinct from *information* (perceptions, interpretations, etc.) which the teacher obtains during the lesson. The personal and unique storehouse of information which each teacher possesses and which he draws on at different points in the lesson has been divided for the purposes of this coding system, into two discrete sections—

(a) Information about pupils

(b) Other information.

7. Information—Pupil

Units in which the teacher's thoughts are focused on pre-lesson impressions of the pupil, beliefs and opinions about the pupil, expectations for the pupil, knowledge of the pupil and family, attitudes towards the pupil, etc. are to be coded as Information—Pupil. Often this information will be expressed about a group of pupils or about pupils in general. The accuracy of the teacher's information is not a matter of concern in coding.

Examples (see parts in brackets):

- T: (Writing is one thing in which Michael has had a lot of difficulty.)
- T: (I know that the kids like me to be fair.)
- T: (Usually he takes things very seriously.)
- T: (Jessica is one I consider to be a class leader.)
- T: (John comes from another school.)
- T: (Lisa finds work very difficult.)

8. Information—Other

Units in which the teacher's thoughts are focused on pre-instructional plans, educational theory and practice, school policies, professional concerns, general knowledge, and similar kinds of matters are coded as Information—Other provided that it is reasonably clear that the information was brought to the lesson by the teacher and was not derived during instruction as is the case with most perceptions, interpretations, and reflections. Instances when the teacher reports failure in attempts to recall information should also be coded as Information—Other.

Units coded as Information—Other will be characterized by the retrieval or calling up from memory of data which are frequently used by the teacher (i) to shape interpretations, (ii) in tactical deliberations and reflections, (iii) in making anticipatory or conjectural propositions.

Examples (see parts in brackets):

- T: (The tape we were starting to listen to was quite short.)

- T: (In the last month or so we've had a few discussions about pollution.)
- T: (I couldn't remember how long the poem was.)
- T: (I remembered that only yesterday I had spelt that word for them) so I decided on the spot to make him try to spell it himself.
- T: Just then I was thinking about the questions I was asking—how can I make the kids really think? (I remembered what we learnt at uni about the kinds of higher level question.)
- T: (We've been told that letting kids call out the answer in unison all the time is wrong.) I remembered that.

9. Goal Statements

Units in which the teacher states intended pupil outcomes are to be coded as goal statements. The goals should be stated in terms of what pupils, not teachers, are to do, be, appreciate, know, experience, etc. Statements which indicate what the teacher plans to do are not to be coded as goal statements. They are, of course, tactical deliberations (prospective).

Usually a goal statement is accompanied by evidence, explicit or implicit, that deliberate action to have pupils achieve the goals is being taken. Units coded as goal statements will therefore sometimes appear with statements about means. When the means are not given or implied (e.g., T: I was hoping they would soon settle down.), the units are usually coded as anticipations as in this case.

Deciding whether such units as the following are tactical deliberations or goal statements may sometimes be difficult:

- T: (I thought we'd have a discussion.)
- T: (We'll go on with some reading, I thought.)

Both of these examples would be coded as tactical deliberations (prospective) because they refer to strategies for achieving unstated pupil goals.

Sections of the protocols where the teacher indicates a pupil outcome which is to be avoided are also coded as *goal statements*.

Examples (see parts in brackets):

- T: I said, 'Heads down' at that point (because I just wanted them to calm down).
- T: That soft voice was a 'put on'. (I wanted a particular response, a relaxed attitude, in the group.)
- T: (I wanted to get their reaction to the words of the song.)
- T: (To get them to think carefully), I said, "Who could tell me what it was?"
- T: (I was trying to get them to think of the different times when they use their senses.)
- T: (I wanted them to identify the senses that they were using.)
- T: (I don't want them to be worried about it.)
- T: (I don't want them to feel threatened.)

10. Fantasies

Expressions of fanciful, extravagant, or bizarre thoughts are to be coded as fantasies. Such units are comprised of fanciful, creative thoughts; they are the product of unrestrained imagination and are not about the reality of the classroom. Units coded as fantasies will lack classroom relevance and will have the characteristics of daydreams, wild or irrational thoughts, and hallucinations. They are usually easily identifiable.

Examples (see parts in brackets):

- T: (I was thinking, "Poor Cam. Wouldn't it be wonderful if I could wave a magic wand and change him into a pupil with plenty of ability, parents who were concerned about his progress, and real interest in school.")
- T: I heard the first bell (9:10 a.m.) of the morning (and thought, "Oh, beaut! Time to go home already").
- T: "Put some fertilizer on the top to see if it'll grow," Peter said. (I thought, "I'd like to put some fertilizer on your top to see if we could make your brain grow.")

11. Feelings

The stimulated recall protocols contain reports by teachers of the emotions they experienced during the lessons. Expressions about these affective states usually contain reference to a feeling or emotions such as pleasure, delight, frustration, annoyance, and anxiety.

Statements about feelings are readily recognizable. It should be noted that units containing the verb *hope* are usually coded as anticipations: for example, T: I was hoping that there would be something interesting coming up on the tape soon.

Examples (see parts in brackets):

T: (It kind of surprised me) his change in attitude towards the writing now.

T: (I was displeased with the reaction.)

T: (There I felt kind of uptight about the situation.)

T: (At that point I was starting to feel a little bit happier about the way things were going.)

T: (Another thing I was thinking was that I enjoyed having a session just to talk and laugh with the kids.)

T: (But I was kind of annoyed at that point.)

T: (I was quite surprised) that Ian was inattentive because usually he takes his work so seriously.

T: (I felt kind of foolish right there.)

Brief Descriptions of Categories in SATIT

NAME OF CATEGORY	DEFINITION	Examples of PROCESSES	Examples of REFERENTS or ITEMS
1. Perception	Unit in which the teacher reports a sensory experience (what was seen, heard, noticed, smelt, etc.) during the lesson; a perception signifies awareness.	sees; hears; notices; feels; smells.	pupils; pupil behaviors; objects; materials; sounds; activities.
2. Interpretation	Unit in which the teacher reports the personal meaning he attaches to a perception of a pupil.	interprets; explains; describes; imputes; attributes.	perceptions.
3. Tactical deliberations (prospective)	Unit in which the teacher identifies or discusses what he plans to do at some future point in the lesson or beyond it.	compares; contrasts; evaluates; asseses; names; lists; identifies.	planned teacher action.
4. Tactical deliberations (retrospective)	Unit in which the teacher is discussing a course of teacher action which he has already used in the lesson.	evaluates; considers; recalls; lists; criticizes.	past teacher action.

NAME OF CATEGORY	DEFINITION	Examples of PROCESSES	Examples of REFERENTS or ITEMS
5. Reflection	Unit in which the teacher considers what has already occurred within the lesson (excluding tactics of the teacher).	evaluates; considers; compares; contrasts; recalls.	past events; experiences; perceptions; interpretations.
6. Anticipation	Unit in which the teacher predicts or speculates on probable future events and outcomes or the future consequences of recent events.	speculates; conjectures; predicts; hopes; expects.	events; results; outcomes; consequences.
7. Information—pupil	Unit in which the teacher recalls or attempts to recall information about a pupil, his background, etc., which was brought to the lesson.	knows; believes; assumes; recalls; remembers.	demographic details; beliefs; facts; impressions; expectation of pupils.
8. Information—other	Unit in which the teacher recalls or attempts to recall all other information held by him before the lesson.	knows; believes; assumes.	lesson content; lesson plans; school policies; professional knowledge.
9. Goal statement	Unit in which the teacher declares what pupils are to achieve.	plans; sets; intends; wants.	pupil objectives.

NAME OF CATEGORY	DEFINITION	Examples of PROCESSES	Examples of REFERENTS or ITEMS
10. Fantasy	Unit in which the teacher expresses fanciful, exaggerated, weird, bizarre thoughts.	fantasizes; daydreams.	people; students; self; events.
11. Feeling	Unit in which the teacher reports an emotional experience or affective state.	feels; experiences; reacts.	emotion.

Procedures to be used when coding.

A. re: Identification of interactive data

1. Rule a single line under the interactive data.
2. Bracket any part of the data which you consider interactive but which you haven't underlined because it is repetitive.

B. re: Segmentation and Unitization

1. Place an oblique line or slash (/) at the end of each unit.
2. Where one unit appears within another unit, draw a double line under the inner unit and place a slash at the end of it.

APPENDIX K

CAPSULE DESCRIPTIONS OF THE SIXTEEN PRIMARY AND FOUR SECOND-ORDER PERSONALITY FACTORS IN THE SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

Capsule Descriptions of the Sixteen Primary Personality Factors in the Sixteen Personality Factor Questionnaire

Factor A: Reserved vs. Outgoing

The person who scores low (sten of 1 to 3) on Factor A tends to be stiff, cool, skeptical, and aloof. He likes things rather than people, working alone, and avoiding compromises of viewpoints. He is likely to be precise and "rigid" in his way of doing things and in personal standards, and in many occupations these are desirable traits. He may tend, at times, to be critical, obstructive, or hard.

The person who scores high (sten of 8 to 10) on Factor A tends to be goodnatured, easy-going, emotionally expressive (hence naturally Affectothymia), ready to cooperate, attentive to people, soft-hearted, kindly, adaptable. He likes occupations dealing with people and socially impressive situations. He readily forms active groups. He is generous in personal relations, less afraid of criticism, better able to remember names of people.

Factor B: Less Intelligent vs. More Intelligent

The person scoring low on Factor B tends to be slow to learn and grasp, dull, given to concrete and literal interpretation. His dullness may be simply a reflection of low intelligence, or it may represent poor functioning due to psychopathology.

The person who scores high on Factor B tends to be quick to grasp ideas, a fast learner, intelligent. There is some correlation with level of culture, and some with alertness. High scores contra-indicate deterioration of mental functions in pathological conditions.

Factor C: Affected by Feelings vs. Emotionally Stable

The person who scores low on Factor C tends to be low in frustration tolerance for unsatisfactory conditions, changeable and plastic, evading necessary reality demands, neurotically fatigued, fretful, easily emotional and annoyed, active in dissatisfaction, having neurotic symptoms (phobias, sleep disturbances, psychosomatic complaints, etc.). Low Factor C score is common to almost all forms of neurotic and some psychotic disorders.

The person who scores high on Factor C tends to be emotionally mature, stable, realistic about life, unruffled, possessing ego strength, better able to maintain solid group morale. Sometimes he may be a person making a resigned adjustment to unsolved emotional problems.

Shrewd clinical observers have pointed out that a good C level sometimes enables a person to achieve effective adjustment despite an underlying psychotic potential.

Factor E: Humble vs. Assertive

The person who scores low on Factor E tends to give way to others, to be docile, and to conform. He is often dependent, confessing, anxious for obsessional correctness. This passivity is part of many neurotic syndromes.

The person who scores high on Factor E is assertive, self-assured, and independent-minded. He tends to be austere, a law to himself, hostile or extrapunitive, authoritarian (managing others), and disregards authority.

Factor F: Sober vs. Happy-go-lucky

The person who scores low on Factor F tends to be restrained, reticent, introspective. He is sometimes dour, pessimistic, unduly deliberate, and considered smug and primly correct by observers. He tends to be a sober, dependable person.

The person who scores high on this trait tends to be cheerful, active, talkative, frank, expressive, effervescent, care-free. He is frequently chosen as an elected leader. He may be impulsive and mercurial.

Factor G: Expedient vs. Conscientious

The person who scores low on Factor G tends to be unsteady in purpose. He is often casual and lacking in effort for group undertakings and cultural demands. His freedom from group influence may lead to anti-social acts, but at times makes him more effective, while his refusal to be bound by rules causes him to have less somatic upset from stress.

The person who scores high on Factor G tends to be exacting in character, dominated by sense of duty, persevering, responsible, planful, "fills the unforgiving minute." He is usually conscientious and moralistic, and he prefers hard-working people to witty companions. The inner "categorical imperative" of this essential superego (in the psychoanalytic sense) should be distinguished from the superficially similar "social ideal self" of Q_3^+.

Factor H: Shy vs. Venturesome

The person who scores low on this trait tends to be shy, withdrawing, cautious, retiring, a "wallflower." He usually has inferiority feelings. He tends to be slow and impeded in speech and in expressing himself, dislikes occupations with personal contacts, prefers one or two close friends to large groups, and is not given to keeping in contact with all that is going on around him.

The person who scores high on Factor H is sociable, bold, ready to try new things, spontaneous, and abundant in emotional response. His "thick-skinnedness" enables him to face wear and tear in dealing with people and grueling emotional situations, without fatigue. However, he can be careless of detail, ignore danger signals, and consume much time talking. He tends to be "pushy" and actively interested in the opposite sex.

Factor I: Tough-minded vs. Tender-minded

The person who scores low on Factor I tends to be practical, realistic, masculine, independent, responsible, but skeptical of subjective, cultural elaborations. He is sometimes unmoved, hard, cynical, smug. He tends to keep a group operating on a practical and realistic "no-nonsense" basis.

The person who scores high on Factor I tends to be tender-minded, day-dreaming, artistic, fastidious, feminine. He is sometimes demanding of attention and help, impatient, dependent, impractical. He dislikes crude people and rough occupations. He tends to slow up group performance, and to upset group morale by unrealistic fussiness.

Factor L: Trusting vs. Suspicious

The person who scores low on Factor L tends to be free of jealous tendencies, adaptable, cheerful, un-competitive, concerned about other people, a good team worker.

The person who scores high on Factor L tends to be mistrusting and doubtful. He is often involved in his own ego, is self-opinionated, and interested in internal, mental life. He is usually deliberate in his actions, unconcerned about other people, a poor team member.

Factor M: Practical vs. Imaginative

The person who scores low on Factor M tends to be anxious to do the right things, attentive to practical matters, and subject to the dictation of what is obviously possible. He is concerned over detail, able to keep his head in emergencies, but sometimes unimaginative.

The person who scores high on Factor M tends to be unconventional, unconcerned over everyday matters, Bohemian, self-motivated, imaginatively creative, concerned with "essentials," and oblivious of particular people and physical realities. His inner-directed interests sometimes lead to unrealistic situations accompanied by expressive outbursts. His individuality tends to cause him to be rejected in group activities.

Factor N: Forthright vs. Shrewd

The person who scores low on Factor N tends to be unsophisticated, sentimental, and simple. He is sometimes crude and awkward, but easily pleased and content with what comes, and is natural and spontaneous.

The person who scores high on Factor N tends to be polished, experienced, worldly, shrewd. He is often hardheaded and analytical. He has an intellectual, unsentimental approach to situations, an approach akin to cynicism.

Factor O: Placid vs. Apprehensive

The person who scores low on Factor O tends to be placid, with unshakable nerve. He has a mature, unanxious confidence in himself and his capacity to deal with things. He is resilient and secure, but to the point of being insensitive of when a group is not going along with him, so that he may evoke antipathies and distrust.

The person who scores high on Factor O tends to be depressed, moody, a worrier, full of foreboding, and brooding. He has a childlike tendency to anxiety in difficulties. He does not feel accepted in groups or free to participate. High Factor O score is very common in clinical groups of all types.

Factor Q_1: Conservative vs. Experimenting

The person who scores low on Factor Q_1 is confident in what he has been taught to believe, and accepts the "tried and true," despite inconsistencies, when something else might be better. He is cautious and compromising in regard to new ideas. Thus, he tends to oppose and postpone change, is inclined to go along with tradition, is more conservative in religion and politics, and tends not to be interested in analytical "intellectual" thought.

The person who scores high on Factor Q_1 tends to be interested in intellectual matters and has doubts on fundamental issues. He is skeptical and inquiring regarding ideas, either old or new. He tends to be more well informed, less inclined to moralize, more inclined to experiment in life generally, and more tolerant of inconvenience and change.

Factor Q_2: Group-dependent vs. Self-sufficient

The person who scores low on Factor Q_2 prefers to work and make decisions with other people, likes and depends on social approval and admiration. He tends to go along with the group and may be lacking in individual resolution. He is not necessarily gregarious by choice; rather he needs group support.

The person who scores high on Factor Q_2 is temperamentally independent, accustomed to going his own way, making decisions and taking action on his own. He discounts public opinion, but is not necessarily dominant in his relations with others (see Factor E). He does not dislike people but simply does not need their agreement or support.

Factor Q_3: Undisciplined Self-conflict vs. Controlled

The person who scores low on Factor Q_3 will not be bothered with will control and regard for social demands. He is not overly considerate, careful, or painstaking. He may feel maladjusted, and many maladjustments (especially the affective, but not the paranoid) show Q_3-.

The person who scores high on Factor Q_3 tends to have strong control of his emotions and general behavior, is inclined to be socially aware and careful, and evidences what is commonly termed "self-respect" and regard to social reputation. He sometimes tends, however, to be obstinate. Effective leaders, and some paranoids, are high on Q_3.

Factor Q_4: Relaxed vs. Tense

The person who scores low on Factor Q_4 tends to be sedate, relaxed, composed, and satisfied (not frustrated). In some situations, his oversatisfaction can lead to laziness and low performance, in the sense that low motivation produces little trial and error. Conversely, high tension level may disrupt school and work performance.

The person who scores high on Factor Q_4 tends to be tense, excitable, restless, fretful, impatient. He is often fatigued, but unable to remain inactive. In groups he takes a poor view of the degree of unity, orderliness, and leadership. His frustration represents an excess of stimulated, but undischarged, drive.

Capsule Descriptions of Four Second-order Personality Factors

Factor Q_I: Introversion vs. Extraversion

The person who scores low on Factor Q_I tends to be shy, self-sufficient, and inhibited in interpersonal contacts. This can be either a favorable or unfavorable finding, depending upon the particular situation in which the person is expected to function; e.g., introversion is a favorable predictor of precision workmanship.

The person who scores high on this factor is a socially outgoing, uninhibited person, good at making and maintaining interpersonal contacts. This can be very favorable in situations that call for this type of temperament, e.g., salesmanship, but should not be considered necessarily favorable as a general predictor, e.g., of scholastic achievement.

Factor Q_{II}: Low Anxiety vs. High Anxiety

The person who scores low on this factor tends to be one whose life is generally satisfying and one who is able to achieve those things that seem to him to be important. However, an extremely low score can mean lack of motivation for difficult tasks, as is generally shown in studies relating anxiety to achievement.

The person who scores high on this factor is high on anxiety as it is commonly understood. He need not be neurotic, since anxiety could be situational, but it is probable that he has some maladjustment, i.e., he is dissatisfied with the degree to which he is able to meet the demands of life and to achieve what he desires. Very high anxiety is generally disruptive of performance, and productive of physical disturbances.

Factor Q_{III}: Tenderminded Emotionality vs. Tough Poise

The person who scores low on Factor Q_{III} is likely to be troubled by pervasive emotionality, and may be of a discouraged, frustrated type. He is, however, sensitive to the subtleties of life, likely to be artistic and rather gentle. If he has problems, they often involve too much thought and consideration before action is taken.

The person who scores high on this factor is likely to be an enterprising, decisive, and resilient personality. However, he is likely to miss the subtle relationships of life, and to orient his behavior too much toward the obvious. If he has difficulties, they are likely to involve rapid action with insufficient consideration and thought.

Factor Q_{IV}: Subduedness vs. Independence

The person who scores low on Factor Q_{IV} is a group-dependent, chastened, passive personality. He is likely to desire and need support from other persons, and likely to orient his behavior toward persons who give such support.

The person who scores high on this factor tends to be an aggressive, independent, daring, incisive person. He will seek those situations where such behavior is at least tolerated and possibly rewarded, and is likely to exhibit considerable initiative.

APPENDIX L

FREQUENCY DISTRIBUTION OF INTERACTIVE FEELINGS CATEGORIZED ACCORDING TO TYPE

Frequency Distribution of Interactive Feelings Categorized According to Type

			Teacher											
			1.1		1.2		3.1		3.2		6.1		6.2	
			L1[a] LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 LA	L1 LA	L2 LA
Feeling	Source, Cause	N[b]	28	5	7	8	20	28	9	10	12	8	4	15
AMAZEMENT	Student perception of the unusual								1					
	Student failure to understand first question									1				
	Excellent student response											1		
AMUSEMENT	Student initiated comment							1						
ANGER	Student disobedience, surliness								1					
	Student restlessness, inattentiveness								2					
	Distraction caused by school bell								1					
	Student interrupting									1				
	Student worked too quickly										1			

[a] Lesson coding: L1 = Lesson 1; L2 = Lesson 2; LA = Language Arts; M = Mathematics.

[b] Number of feelings in each lesson.

Feeling	Source, Cause	Teacher 1.1		1.2		3.1		3.2		6.1		6.2	
		L1[a] LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 LA	L1 LA	L2 LA
	N[b]	28	5	7	8	20	28	9	10	12	8	4	15
ANNOYANCE	Material for student use disorganized	1											
	Student impatience	1											
	Students not following directions			1	1								
	Student restlessness				1								2
	Student disrupts rest of class					1							
	Late notice from parent aide						1						
	Lesson delays—low momentum						1						
	Student seeking attention when teacher is talking						1						
	Student disapproval								1				
	Student initiated comment (tangential thinking)									1			
	Student underachievement									1			
	Self-incomplete info-giving by teacher											1	
	Student deviance (mild)												1
	Student failed to observe rule			1									

[a] Lesson coding: L1 = Lesson 1; L2 = Lesson 2; LA = Language Arts; M = Mathematics

[b] Number of feelings in each lesson.

			Teacher										
			1.1		1.2		3.1		3.2		6.1		6.2
			L1[a] LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 LA	L1 LA	L2 LA
Feeling	Source, Cause	N[b]	28	5	7	8	20	28	9	10	12	8	4	15
ANXIETY	Student aides late		1											
	Students may become inactive											1		
APPREHENSION	Students inactive		1											
BORED	Too many student answers										1			
CONCERN	Student aides late		1											
	Teacher forgot her workbook									1				
	Atypical student behavior									1				
DEFENSIVE	Student in trouble with school administrators										1			
DEJECTION	Student's slow progress—lack of parental support		1											
DELIGHT	Student response (excellent)		1									1		
	Student success			1										
	Ready student response										1			
	Students attentive											1		

[a] Lesson coding: L1 = Lesson 1; L2 = Lesson 2; LA = Language Arts; M = Mathematics.

[b] Number of feelings in each lesson.

		Teacher											
		1.1		1.2		3.1		3.2		6.1		6.2	
		L1[a] LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 M
Feeling	Source, Cause	N[b] 28	5	7	8	20	28	9	10	12	8	4	15
DESPERATION	Student dissatisfaction with lesson						1						
DISAPPOINTMENT	Student behavior unruly in prelesson period									1			
DISMAY	Students lack knowledge of previously taught content											1	
DISORGANIZATION	Lesson plan going awry						3						
DISPLEASURE	Student reaction unfavorable					1							
DISSATISFACTION	Discussion in lesson off the planned topic			1									
DISTRESS	Lesson disorganized	1											
	Student underachievement		1										

[a] Lesson coding: L1 = Lesson 1; L2 = Lesson 2; LA = Language Arts; M = Mathematics.

[b] Number of feelings in each lesson.

		Teacher											
		1.1		1.2		3.1		3.2		6.1		6.2	
		L1[a] LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 LA	L1 LA	L2 LA
Feeling	Source, Cause N[b]	28	5	7	8	20	28	9	10	12	8	4	15
EQUANIMITY	Low ability student slow in completing task	1											
	Students tired of discussion topic			1									
EXASPERATION	Incorrect chorused response	1											
	Classroom noise	1											
	Student lacks textbook						2						
	Lesson not proceeding smoothly												1
FRUSTRATION	Classroom noise	1											
	Student initiated comment	1											
	Student aides late	1											
	Lesson disrupted	1					3						
	Student error in work		1										
	Insufficient time in lesson						1						
	Missing textbooks						1						
	Student behavior											1	
	Classroom noise												1
FOOLISHNESS	Teacher set too difficult a task					1							

[a] Lesson coding: L1 = Lesson 1; L2 = Lesson 2; LA = Language Arts; M = Mathematics

[b] Number of feelings in each lesson.

Feeling	Source, Cause		Teacher											
			1.1		1.2		3.1		3.2		6.1		6.2	
			L1[a] LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 LA	L1 LA	L2 LA
		N[b]	28	5	7	8	20	28	9	10	12	8	4	15
GUILT	Using students as monitors							1						
	Providing insufficient guidance							1						
	Restricting progress of more capable students							1						
	Failing to challenge students with work							1						
	Inadequate lesson preparation							1						
	Use of reward and punishment							1						
HUMOUR	Student statement		2											
	Lesson disruption—previously, cause of considerable stress		1											
IMPATIENCE	General feeling—no identified source							1						

[a] Lesson coding: L1 = Lesson 1; L2 = Lesson 2; LA = Language Arts; M = Mathematics.
[b] Number of feelings in each lesson.

Feeling	Source, Cause	Teacher 1.1		1.2		3.1		3.2		6.1		6.2	
		L1[a] LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 LA	L1 LA	L2 LA
	N[b]	28	5	7	8	20	28	9	10	12	8	4	15
INCREDULITY	Student initiated comment about missing text						1						
	Students failed to notice unusual feature in picture							1					
	Students working well								1				
IRRITABILITY	Student engaging in atypical behavior								1				
	Classroom noise												1
LISTLESS, TIRED	General feeling						1						
	Student initiated question												2
PANIC	Teacher lacks information							1					
PERTURBATION	Lesson going awry						2						
PITY	Student (low ability) with poor recall									1			

[a] Lesson coding: L1 = Lesson 1; L2 = Lesson 2; LA = Language Arts; M = Mathematics
[b] Number of feelings in each lesson.

Feeling	Source, Cause		Teacher											
			1.1		1.2		3.1		3.2		6.1		6.2	
			L1[a] LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 LA	L1 LA	L2 LA
		N[b]	28	5	7	8	20	28	9	10	12	8	4	15
PLEASURE	Good student response		2		1		1				2	2		1
	Shy student (have-not) responding				1	2								
	Topic raised by student for discussion				1									
	Student progress in speech					1								
	Shift in student attitude toward a more positive one						1							
	Sharing activity with students						1							
	Student restraint						1							
	Students able to settle down and work						1							
	Variety in discussion topics						1							
	Individuality in student thinking						1							
	Student attentiveness						1							
	Student set high goals for self							1						
	Student advises teacher of teacher's mistake									1				

[a] Lesson coding: L1 = Lesson 1; L2 = Lesson 2; LA = Language Arts; M = Mathematics.
[b] Number of feelings in each lesson.

		Teacher											
		1.1		1.2		3.1		3.2		6.1		6.2	
		L1[a] LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 LA	L1 LA	L2 LA
Feeling	Source, Cause N[b]	28	5	7	8	20	28	9	10	12	8	4	5
	Teacher's 'spur of the moment' idea											1	
	Student participation in thinking process												1
PUZZLEMENT	Unusual student response	1											
	Student lack of understanding												1
REGRET	Insufficient time to indulge student needs	1											
	Slow work by students	1											
	Teacher delayed student initiated comment				1								
	Capable student in trouble with school									1			
	Unable to retain good ideas of students										1		
RELAXATION	Lesson improving					1							

[a] Lesson coding: L1 = Lesson 1; L2 = Lesson 2; LA = Language Arts; M = Mathematics.
[b] Number of feelings in each lesson.

		Teacher											
		1.1		1.2		3.1		3.2		6.1		6.2	
		L1[a] LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 LA	L1 LA	L2 LA
Feeling	Source, Cause N[b]	28	5	7	8	20	28	9	10	12	8	4	5
RELIEF	Teacher had avoided using material in another kind of lesson					1							
	Lesson showed signs of success										1		
	Lesson gaining momentum												1
SURPRISE	High ability student slow in completing task	1											
	Students didn't meet expectations	1											
	Student response—unusual	1											1
	Student unable to recall, answer	1	1					1					
	Student error				1								
	Shift in student attitude					1							
	Lack of student participation					1							
	Student's unusual behavior					1							
	Student's correct answer							1					

[a] Lesson coding: L1 = Lesson; L2 = Lesson 2; LA = Language Arts; M = Mathematics.
[b] Number of feelings in each lesson.

		Teacher											
		1.1		1.2		3.1		3.2		6.1		6.2	
		L1[a] LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 M	L1 LA	L2 LA	L1 LA	L2 LA
Feeling	Source, Cause N[b]	28	5	7	8	20	28	9	10	12	8	4	5
	Students lack understanding								1				
	Student completed work								1				
	Teacher's 'spur-of-the moment' idea												1
	Teacher's failure to give key information												1
SYMPATHY	Student experiencing work difficulty		1										
	Low ability students									1			
TENSION	Videotaping and disrupted lesson plan	1											
	Violation of preservice principle				1								
	Class restlessness					3	1						
TOLERANCE	Student deviance					1							

[a] Lesson coding: L1 = Lesson 1; L2 = Lesson 2; LA = Language Arts; M = Mathematics

[b] Number of feelings in each lesson.

APPENDIX M

RULES, BELIEFS, AND PRINCIPLES CITED BY TEACHERS IN THE STIMULATED RECALL INTERVIEWS

Rules

(N.B. An asterisk indicates that a rule has been repeated at another point in the interviews.)

Rules Cited by Teacher 1.1

1. Children should not interrupt the teacher when she is talking to the class.
2. When talking in the classroom, children should keep their voices low to avoid distracting others.*
3. Students should think for themselves and not be swayed by the answers of others.
4. Children are not to seek teacher assistance in creative tasks but are to 'do their own thing.'
5. Children should work first and then, upon its completion, go to play activities provided in the classroom.
6. Talking by students is permitted in a group project or where there is a valid purpose for talking.
7. Students can help each other but they most not copy.
8. Children who are handed several work sheets are expected to distribute them to others in their group.

Rules Cited by Teacher 1.2

1. Students are not allowed to approach the teacher when she is discussing a lesson with another group.
2. Students may seek assistance with work from their peers.
3. Students must remain at their desks to ask a question.
4. Students should not borrow from each other but use materials provided by the teacher.

Rules Cited by Teacher 3.1

1. Children are not to socialize in the classroom before they finish their work.

Rules Cited by Teacher 3.2

1. Before dismissal from the classroom, children must return to their desks, tidy them, and wait for instructions.

2. Children should raise their hands during teacher questioning periods only if they know the answer.

3. Students must not interrupt when the teacher is talking to others.

Rules Cited by Teacher 6.1

1. Students should act independently.

2. Students should be responsible to themselves.

Rules Cited by Teacher 6.2

1. Answers to questions should not be called out.

2. Treat others courteously.

3. Be ready to apologize when necessary.

4. No student should talk while another is responding.

5. Students can change their work locations if they're working on individual assignments.

Beliefs

(N.B. An asterisk indicates that a belief has been repeated at another point in the interviews.)

Beliefs Cited by Teacher 1.1

1. Grade One children resent being shunned by the teacher.
2. Children like to play exciting character parts in drama.
3. Making decisions is part of growing up.
4. Grade One children are capable of making decisions.
5. Children are pleased if the teacher does their art work for them.
6. Some students tend to become very dependent on the teacher which is undesirable.
7. Towards the end of Grade One, children are mature enough to be able to work independently.
8. Students need to develop positive self images.
9. There is an insufficient expression of love in the world.
10. Creativity and spontaneity are sacrificed if tight controls are imposed in the classroom.
11. If too much freedom exists, children don't develop skills.
12. Students enjoy the experience of being able to provide an answer to a question.
13. More chorus answering tends to occur when students are confident they know the answers and when they want to display their knowledge.
14. Each class has to complete the curriculum for that grade.
15. Students lose their identities in large schools.
16. Students can 'see through' the artificiality of teachers.
17. Students like teachers to be honest with them.
18. Students should see both sides of a teacher.
19. Grade One children are not old enough to exercise self control.

20. Students learn from making mistakes.

Beliefs Cited by Teacher 1.2

1. Children need to be alert to think about the lesson.
2. Teachers notice the children immediately in front of them more.

Beliefs Cited by Teacher 3.1

1. Students are happy with majority choice.

Beliefs Cited by Teacher 3.2

1. Children know how the teacher feels.
2. Attentiveness is a habit.
3. Calling out the answer interferes with the discovery learning process in other children.
4. If the teacher speaks loudly she will have a noisy class.
5. Children like praise.
6. Children are fascinated by pictures of children their own age.
7. Noise at transition times in lessons is admissible.

Beliefs Cited by Teacher 6.1

1. Self analysis of written expression leads to improvement in writing skills.
2. Some pupils like to be the first to finish.
3. Student initiated questions are of little value.
4. Children in this class are 'a strange bunch.'
5. The teacher is an emotional catalyst for students.
6. Low ability students learn by hearing the ideas of others.
7. Teachers can't be expected always to do things that will keep children interested.

Beliefs Cited by Teacher 6.2

1. Writing on the blackboard by the teacher helps to focus student attention on the main points.
2. Seeing is an aid to remembering.
3. There is a place in the classroom for emotional outbursts by the teacher.
4. Children seem to think that the answers to all questions are stored in their memories.
5. Students enjoy being able to talk informally with teachers.
6. Students enjoy being able to think of something which has been overlooked by the teacher.

Principles

(N.B. An asterisk indicates that the principle has been repeated at another point in the interviews.)

Principles Cited by Teacher 1.1

1. Provide low ability group with alternating periods of work and checking.
2. Teachers should regularly look up to monitor the class to check if any problems are arising.
3. Try to ensure some success for students.
4. Don't endanger pupil security by giving too much new material too quickly.
5. Proceed from known to unknown with low ability groups.
6. Teachers should try to avoid being the sole rule maker all the time.
7. Never compare children's art work.
8. Teachers should desist noise when it interferes with work of others.**
9. Ask non-volunteers to respond to questions—
    - (a) to involve shy pupil and to give him experience in getting answer right;
    - (b) to suppress the dominative pupils who would overshadow the shy ones.
10. Use student work sheets to reinforce what work books don't cover sufficiently well.
11. Use enough items in a speed test in basic skills to determine if students are guessing or really understand.
12. Limit time for test completion to prevent children from resorting to counting on their fingers.
13. Teacher should remain seated when students are doing a written test.
14. Teachers can help children develop good self concepts by not being overcritical of them.

15. Teachers should provide a lot of activities for children to select from when their work is finished.

16. Impose a time limit on tests in basic skills to find out who don't finish on time (for diagnostic purposes).

17. Try to have verbal contacts with disadvantaged children as frequently as possible.

18. Allow chorus answering with small groups for quick review work.

19. Constant repetition by the teacher of the rule forbidding chorus answering is the way to desist chorus answering.

20. Where some students are having problems the teacher should work with them as a small group.

21. Don't continue talking if students aren't listening.

22. In Grade One it is necessary for the teacher to have frequent contacts with students during the day.

23. Be genuine with students.

24. Teacher should avoid focusing attention on one pupil for too long.

25. Ensure that students correct previous errors in written work.

26. Insist repeatedly that having work incorrect is not a crime.

Principles Cited by Teacher 1.2

1. Elaborate on what children are saying or talking about to enhance their self concepts.

2. Limit the number of participants in "show and tell" activities.

3. When pupils are restless, engaging them in a short burst of physical activity helps to regain their attention.

4. Foster creativity in craft work by not imposing any requirements or placing any restrictions on the pupils.

5. Avoid talking when children are thinking because it distracts them.*

6. When students are discussing a topic, allow them to talk themselves out before continuing with the next phase of the lesson.

7. Follow up questions must be based on pupils' previous responses or statements.

8. Forbid students to sit a long way from the centre of a group.

9. If pupil response is inaudible, the teacher should repeat it.

10. Ensure that everybody has a chance to relate their personal experiences.

11. Direct questions at inattentive pupils in order to make them attentive.

12. Don't distribute materials until they are needed.

13. Place materials at the front of the room for students to pick up when they need them.

14. The teacher should distribute materials to the class if they're not seated in rows.

15. If students are engaged in new work, the teacher should circulate but if work is revision work, the teacher could remain seated and check students' work at that location.

Principles Cited by Teacher 3.1

1. Class restlessness can be combatted by engaging students in work.

2. When wanting to reinforce desirable behavior in a classroom select class leaders as the students to reinforce.

3. Reinforce desirable behavior to influence those displaying negative behavior to conform.

4. Never use the term "bad" to denote or describe pupils.

5. Use indirect means such as innuendo to desist inattentiveness.

6. Ignore instances when a student calls out a correction to a teacher or student error.

7. When a student has lost the place either carry on to avoid time loss, or ask another pupil to indicate the place.

8. Tolerate called-out pupil statements if they are relevant.

9. Use positive kinds of motivation when possible.

10. Resort to use of rewards and punishments only when all else

has failed.

Principles Cited by Teacher 3.2

1. In discussion lessons ensure that children sit beside somebody new each time.
2. Vary the order in which students are called out to form groups.
3. Don't invite a student whose answer is likely to be "off the track" to answer a question.
4. Students should discover answers for themselves and not be told by the teacher.*
5. Teachers should never laugh derisively at any child.
6. Speak softly to induce a calm state in students.
7. Avoid saying 'no' to a pupil's wrong answer when you know the student is trying.
8. If a student is misbehaving, it is appropriate to indicate that his incorrect answer is wrong by saying, "No."
9. Refuse to ask questions of pupils who call out, "I know, I know."
10. Involve the student who frequently is a nonparticipant in the classroom if he shows an interest.
11. Always try to listen to children's stories of their own experiences.
12. Avoid the use of sarcasm.
13. Go through a student's written work in his presence to probe further his understanding and to make evaluative comments.
14. Be supportive of all children.
15. Desist student noise by verbal intervention or by being silent for a long time.
16. Avoid spending prolonged periods of time on any single activity. Use short periods.

Principles Cited by Teacher 6.1

1. Encourage verbal participation by all pupils.
2. Try to maintain pupils' self respect and positive self image.
3. Foster enthusiasm, try to maintain it, avoid endangering it.*
4. Maintain pupils' self respect and enthusiasm even at the cost of lower academic standards.
5. Ignore silly attention-seeking behavior.
6. Emotions should be expressed by the teacher in a restrained way.
7. Stand quietly and say nothing for some minutes to regain attention of students.
8. Keep exciting lessons for the "dead" months of the school year.
9. If the topic for creative writing is an abstract one, pupils have to be stimulated more.

Principles Cited by Teacher 6.2

1. Desist deviant behavior with a smile.
2. Have students settle down before you start a lesson.
3. Allow pupils time to think about the question asked.
4. Use rhetorical questions to desist inattentive pupils.
5. Try to provide good student thought process models for other students to pattern themselves on.
6. Record points to be reinforced on the blackboard.
7. Give students plenty of time to complete the task to avoid having them become frustrated.*
8. When annoyed by pupil deviance, (i) pause, or (ii) walk out and return when pupils are ready to be taught again.
9. Check individual seat work of students whom you think will have difficulty with the task.
10. Suggest to a pupil that his answer isn't quite right by innuendo, facial expression, or other indirect means, but

don't say, "No."*

11. Return to questions asked earlier but which have been overlooked in the discussion.

12. Capitalize on differences in pupil opinions to show that opinions may differ and that we can have valid reasons for holding different opinions.

13. Good-natured teasing of students is useful for establishing teacher-pupil rapport.

14. Use the guided discovery approach when possible.

15. If pupils don't work productively in a group seating arrangement, then students should be seated individually in rows.

16. Use sarcasm in non-serious situations.

17. Don't be critical of students if there is any uncertainty about whether pupils are misbehaving or not.

18. Avoid shouting.*

19. Use veiled warnings to desist undesirable behaviour.

20. At the end of a lesson, summarize the main points.

21. Include yourself in the instructions when setting assignments.

22. Reinforce students whenever possible.

23. In a discussion lesson build on pupil answers.

24. Use open ended, higher level questions.

25. Be sincere.

26. Spend time talking to students about their concerns in recess time and out of school hours.

APPENDIX N

DETAILS OF TEACHERS' PREINSTRUCTIONAL PLANS

Grade: I
Teacher: 1.1
Subject: Language Arts

Goals/Purposes	Content/Activities	Strategies	Organization	Materials/Resources
Group 1 (High Ability)			•Use ability groups	
•Provide enjoyment for group •Test word knowledge •Test ability to follow written directions	•Fun activity		•Individual seat work	•Worksheets (one copy for each child)
•Foster creativity •Develop expression	•Puppet making •Play-"The Three Little Pigs"		•Group work •Work space to be used by this group is corridor outside room	
•Develop problem solving ability	•Problem: Ten students and only eight puppets required	•Encourage students to make group decision		

Grade: I
Teacher: 1.1
Subject: Language Arts (cont'd)

Goals/Purposes	Content/Activities	Strategies	Organziation	Materials/Resources
Group 2 (Middle Ability) •Develop ability to use compound words and blends in new situations •Develop ability to make new words and use them correctly	•Follow-up activity	•Telling •Monitor work of students •Work with groups, individuals as required	•Individual seat work	•Worksheet
Group 3 (Low Ability)	•Rhyming words and word recognition •New words	•Drill •Structured approach—do one small thing at a time •Use blackboard for teaching, reinforcing.		•Workbooks •Worksheets
8	7	7	5	4

Grade: I
Teacher: 1.1
Subject: Mathematics

Goals/Purposes	Content/Activities	Strategies	Organization	Materials/Resources
•Social and emotional growth		•Respond in a positive way		
•Review of basic number facts	•Minus facts to nine		•Individual seat work	•Worksheet
•Develop idea that two groups make a larger group		•Check work by movement round classroom	•Whole class activity	•Plastic counters
			•Distribute materials to students seated at desks	•Worksheet
•Develop related number sentences		•Identify students with problems; work with these students individually	•Individual seat work	
	•Fun activity for students achieving mastery level in earlier activities			•Worksheet
4	2	3	4	4

Grade: 1
Teacher: 1.2
Subject: Language Arts

Goals/Purposes	Content/Activities	Strategies	Organization	Materials/Resources
•Test student recall of vowel sound	•Short 'a' sound •Finding short vowel sounds	•Discussion	•Whole class	•Two papers (worksheets)
		•Give directions to all three groups before spending time with each group	•Sequence—work first with Group 2, then with Group 1, then back to Group 2 •Use group approach	
Group 1 (High Ability)	•Theme: "Firemen Protect Us"—duties of firemen, what happens at a fire, causes of fire	•Discussion based on personal experiences		
•Develop skills of written expression-focus on ideas, capital letters, periods	•Written expression on topics chosen by individual students but related to 'fire'	•Allow students to choose topic on which they write	•Individual seat work	

Grade: I
Teacher: 1.2
Subject: Language Arts (cont'd)

Goals/Purposes	Content/Activities	Strategies	Organization	Materials/Resources
Group 2 (Middle Ability)				
•Test recall, orally and in writing, of details of previously read stories	•Answering questions on worksheets by going back to story for answer			•Two worksheets on end of unit activities
	•Theme: "Sharing"—student experiences, families, feelings about siblings, mothers' duties, others' points of view	•Discussion •Show sympathy for students in their feelings		
•Determine if student can relate experiences to discussion (focus on sequence, use of words about feelings)	•Writing activity—theme related to discussion			

Grade: I
Teacher: 1.2
Subject: Language Arts (cont'd)

Goals/Purposes	Content/Activities	Strategies	Organization	Materials/Resources
Group 3 (Low Ability) •Learn how to write day, date •Know what today's time table day is •Develop skills in oral expression •Increase vocabulary	•Copying printing from blackboard (emphasis on quality of printing) (NB. Teacher recorded their stories on blackboard earlier) •Reading a story •Language activity game			
8	10	6	4	2

Grade: 1
Teacher: 1.2
Subject: Mathematics

Goals/Purposes	Content/Activities	Strategies	Organization	Materials/Resources
	•Review of 1/2		•Whole class activity	
	•Review missing addends	•Use blackboard •Work examples orally	•Space—students seated on carpet in a group close to blackboard	
•Know what 1/3 of a shape is •Know what 1/3 of a number is	•Introduce 1/3			•Flannel board
	•Complete work sheets	•Work class together on this worksheet, using blackboard to demonstrate	•Individual seat work •Teacher to distribute worksheets •Individual seat work—for only those who achieve mastery on work related to 1/3 •Students to pick up worksheets as they complete first worksheet	•Worksheet (on 1/3) •Worksheet on missing addends
2	4	2	6	3

Grade: 3
Teacher: 3.1
Subject: Language Arts

Goals/Purposes	Content/Activities	Strategies	Organization	Materials/Resources
		•Give students choice of 3 activities		
•Develop use of senses	(1)•Listening tape with questions			
•Develop word recognition				•'Words to Use' books
	•Using senses in different activities (Children who finish can go on to these activities)	•Explain the stations or activity centers		•Activity centers on theme of senses
	(2)•Some poetry •Theme: senses	•Discussion •Spend about ten minutes talking about senses		
	(3)•Reading	•Use groups		

Grade: 3
Teacher: 3.1
Subject: Language Arts (cont'd)

Goals/Purposes	Content/Activities	Strategies	Organization	Materials/Resources
Group 1 (High Ability) •Develop ability to choose important details of a story	•Selecting synonyms for words in worksheet		•Instructions for group to be placed on blackboard	•Worksheets on synonyms
Group 2 (Low Ability) •Develop comprehension skills	•Story—"The Bear with the Stumpy Tail" •Complete exercise after reading story		•Instructions for group to be placed on blackboard	•Practical book exercise
4	8	5	2	4

Grade: 3
Teacher: 3.1
Subject: Mathematics

Goals/Purposes	Content/Activities	Strategies	Organization	Materials/Resources
			•Use two groups	
Group 1 (High Ability)				
•Students to develop realization of link between x'n and ÷'n	•Review of x'n facts			
	•Basic facts in division	•Discussion		•Discussion pages in text
	•Written assignment	•Checking	•Individual seat work followed by group work on floor	
Group 2 (Low Ability)				
	•Review of 2 and 3 digit subtraction	•Spend little time on formal teaching	•Individual seat work	
		•Check pupil work individually		
1	4	4	3	1

Grade: 3
Teacher: 3.2
Subject: Language Arts

Goals/Purposes	Content/Activities	Strategies	Organization	Materials/Resources
•Develop skills—drawing conclusions, making inferences, interpretation (also stated as: to see how much students can observe; to see how much they can draw from the picture)		•Present one picture at a time •Ask questions about one before showing the next—When was the picture taken? Where is the train? Where is it coming from? (12 specific questions were listed similar to the ones above)	•Whole class activity •Use space at front of class •T sits on chair •Students to be seated on floor	•3 pictures of the same object from different distances
	•Creative writing on the child in the picture		•Allow 15 minutes for writing before starting group work in next phase in lesson	
•To test student recall of detail in picture	•Students are to include as much as they can remember of the pictures in their writing after pictures have been put away			
	•Phonics or interpretation lesson		•Use groups	
2	3	2	6	1

Grade: 3
Teacher: 3.2
Subject: Mathematics

Goals/Purposes	Content/Activities	Strategies	Organization	Materials/Resources
	•Relationships between x'n and ÷'n, and between ÷'n and -'n			
	•Finding relationship between numbers in a sequence	•Play a game—"What's My Rule" (Read a sequence, ask students for process)		•Eight examples, 2 in each of x'n, ÷'n, +'n, & -'n, on card for use by teacher
	•Practice exercises	•Work examples orally		•Textbook
	•Review of x'n (timed test)	•Ask students to write numbers from 1 to 25 •Ask a question in basic x'n facts every 10 seconds (students record answers)	•Teacher to distribute papers	•Test papers
0	5	4	1	3

Grade: 6
Teacher: 6.1
Subject: Language Arts

Goals/Purposes	Content/Activities	Strategies	Organization	Materials/Resources
•Improve sentence-writing ability with expressive words		•Write a class noun on the blackboard		
•Increase student awareness of alternatives for plain words	•Concepts—noun, verb	•Ask students for examples of objects within the class •Ask students for action words to describe what the objects do. •Write skeleton sentences on the blackboard (include examples from students' previous writing) •Expand basic sentences by using expressive words (oral work) •Stress use of expressive nouns, verbs, and adjectives		

Grade: 6
Teacher: 6.1
Subject: Language Arts (cont'd)

Goals/Purposes	Content/Activities	Strategies	Organization	Materials/Resources
	•Writing expressive sentences based on skeletal ones provided by teacher	•Write five plain sentences on blackboard •Read sentences written by students		
2	2	8		

Grade: 6
Teacher: 6.1
Subject: Language Arts

Goals/Purposes	Content/Activities	Strategies	Organization	Materials/Resources
•Produce best possible writing by students	•Creative writing activity—a descriptive paragraph •Use similes in writing •Write about sensory inputs base on observation of experiment by teacher •Record sequence of teacher activities in demonstration •Record all their sensory inputs during observation of demonstration	•Demonstrate process •Use a step-by-step approach		
1	5	2		

Grade: 6
Teacher: 6.2
Subject: Language Arts

Goals/Purposes	Content/Activities	Strategies	Organization	Materials/Resources
•Develop in students an appreciation of the need to use context in reading and understanding •Develop in students a knowledge of how to use context	•Three words not familiar to the students	•Read out passage to ensure that students have correct pronunciation of words •Ask students to find contextual clues to meaning of words •Ask students to announce the meaning of word •Ask student to indicate the process used to establish meaning of words •Teacher will show how meaning can be developed if students cannot	•Pass readers out •Independent seat work	
	•Followup activity -fill in blanks in a story, using contextual clues	•Move around classroom to monitor student work •Record names of those having difficulties		•Worksheets (story with blanks)
2	2	7	2	1

Grade: 6
Teacher: 6.2
Subject: Language Arts

Goals/Purposes	Content/Activities	Strategies	Organization	Materials/Resources
Groups 1,2,3 •To see how well they can answer specific questions in written form	•Completing written answers to questions on worksheets		•Use four groups	•Three different stories
Group 4 •To see how well students understand the story •To see how well students understand plot, setting, theme, story •Help students develop their thinking processes •To expose them to the processes involved in answering the questions •To see how well they can handle discussion	•Read story •Find answers to questions on worksheet •Theme: Conflict (Man versus man, man versus nature)	•Teacher direction •Probe •Ask leading quest. •Use student response to a question & take them through the thinking process required to answer question fully •Identify one student having difficulty to lead through the thinking process •Relate questions to child's experience •Use analogies	•Distribute materials •Hold discussion round a table	•Set of questions pertaining to the story
6	4	7	3	2

APPENDIX O

LOW INFERENCE PROCESS DATA ON VIDEOTAPED LESSONS AND TOTAL PERIODS OF OBSERVATION IN EACH CLASSROOM ON A SUBJECT BASIS

Frequencies in Low Inference Process Data

		Teacher																					
		1.1				1.2				3.1				3.2				6.1			6.2		
Variable		LA Lesson 1	M Lesson 2	All Lang Arts	All Math	LA Lesson 1	M Lesson 2	All Lang Arts	All Math	LA Lesson 1	M Lesson 2	All Lang Arts	All Math	LA Lesson 1	M Lesson 2	All Lang Arts	All Math	LA Lesson 1	LA Lesson 2	All Lang Arts	LA Lesson 1	LA Lesson 2	All Lang Arts
Academic Response Opportunities																							
Child:	PRE	4		36	4	1	6	22	6							1					2		56
	NVOL	1		28	1		11	21	11	7	26	24	51	9	4	50	6	2	1	13	9	12	93
	VOL	1		11	6	2	24	40	24	19	27	36	42	59	81	474	161	85	9	151	6	18	83
	CALL	1		17	1	13	3	70	3			8	2	1		2				5		7	19
Quest:	*PROCESS			1	1		9	14	9	11	5	212	22	12	2	135	15	50	10	74	11	16	73
				2C			2C		2C														
	*PRODUCT	6	0	75	9	16	29	120	35	15	48	45	70	54	82	354	151	36		93	1	11	117
		46C	1C	158C		4C	24C	40C	24C														
	*CHOICE											1	3		1	38	1					1	
Answer:	+	4		72	9	15	34	120	34	20	36	46	66	47	58	368	126	76	10	143	7	20	128
	±			7			2	12	2	4		9	3	6	6	46	8	2		9	8	10	47
	-	1		5	1	1	4	8	4		13	5	15	13	13	74	20	8		16		4	47
	DK							1			2	4	3	2	3	21	7	1		1		2	3
	NR	2		8	2		4	12	4	2	2	4	8	1	5	18	6				2	1	26
Teacher Feedback:	++			6			1	2	1	3	1	3	3	3		11	1	4		9	2	1	13
	=															2							
	0	1		11	1	2	5	19	5	1	1	5	2	12	28	50	34	21		39	1	5	60

*C indicates question to which chorused responses were given.

Variable		Teacher																					
		1.1				1.2				3.1				3.2				6.1			6.2		
		Lesson 1 LA	Lesson 2 M	All Lang Arts	All Math	Lesson 1 LA	Lesson 2 M	All Lang Arts	All Math	Lesson 1 LA	Lesson 2 M	All Lang Arts	All Math	Lesson 1 LA	Lesson 2 M	All Lang Arts	All Math	Lesson 1 LA	Lesson 2 LA	All Lang Arts	Lesson 1 LA	Lesson 2 LA	All Lang Arts
	AFFIRM	4		57	8	13	32	101	32	19	34	47	62	40	45	359	111	40	10	91	9	20	77
	PCSS										1		1	1		9	1	1		3	2		7
	GIVE ANS			4		1		4				3		3		13	1	2		2	2	2	18
	ASK OTH	1		1	1		2	1	2	10	11	19	15	18	33	144	42	49		59	2	8	52
	CALL			3				2				1											1
	REPT Q			2			2	1	2		2		2	1	2	3	2					1	7
	REPCLU	1		1	1		1	6	1		3	1	8	9	5	14	6	1		2	2	3	19
	NEW Q			12			3	12	3	2		4	2	2		9					3	4	17
	REP SS									3		3											17
Self Ref Q:																							
Sub:	PREF					3		7				3	10							7		5	17
	EXP					48		70		9		16	6			1			1	5	2	2	13
?																							
Nonsub:	PREF																						
	EXP					1		1			1	1	6										
Opinion Q:	NR															1				1			11
	+													1		1							1
	-																						
	0													10		14							
	DISAG							2						1		5			1	1			4
	ACPT			2		7		21				1		4		14			9	18		12	45
	INTEG													1		1			2	3			3

	Teacher																					
	1.1				1.2				3.1				3.2				6.1			6.2		
Variable	LA Lesson 1	M Lesson 2	All Lang Arts	All Math	LA Lesson 1	M Lesson 2	All Lang Arts	All Math	LA Lesson 1	M Lesson 2	All Lang Arts	All Math	LA Lesson 1	M Lesson 2	All Lang Arts	All Math	LA Lesson 1	LA Lesson 2	All Lang Arts	LA Lesson 1	LA Lesson 2	All Lang Arts
Student Initiated Questions																						
CALL			5	3	8	3	33	3	2	1	9	7		1	15	3	2	4	11		1	6
REL			5	3	8	3	33	7	3	1	10	8	1	1	22	3	9	6	28	2	1	22
IRREL					1		3	1	1		2				4		1		5			
‡								1														
=															1							
0																			1		1	3
DELAY											2				2					1		4
NACPT			1		2		3								5				3			
BRIEF			2	2	4	3	23	6	3		8	3		1	18	1	7	6	24			7
LONG			2	1	2		7	2	1	2	2	6				2	3		6	1		8
RDRCT					1		2				1											
‡																						
=																						
WARN																		1	1			1
Student Initiated Comments																						
CALL	6		59	6	31	9	128	11	10	6	49	12	2		32	4	1	19	44		1	22
REL	6		55	4	36	9	130	12	18	1	57	15	21		55	6	4	19	65			46
IRREL			4	2		1	14	1	4	5	14	10			11		2	5	21		1	9
‡			1		1		1		1		1		3		3				2			4

Variable	Teacher																					
	1.1				1.2				3.1				3.2				6.1			6.2		
	Lesson 1 LA	Lesson 2 M	All Lang Arts	All Math	Lesson 1 LA	Lesson 2 M	All Lang Arts	All Math	Lesson 1 LA	Lesson 2 M	All Lang Arts	All Math	Lesson 1 LA	Lesson 2 M	All Lang Arts	All Math	Lesson 1 LA	Lesson 1 LA	All Lang Arts	Lesson 1 LA	Lesson 2 LA	All Lang Arts
=											1				2							
0			3				6		6		10	6	2		14			1	1			2
DELAY			2		3		16		1		3	2						1	4			2
NACPT	1		5	3		1	7	1		1	2	2	3		7			4	12		1	8
ACPT	5		47	3	31	9	109	12	7	4	37	13	10		33	4	6	18	69			44
INTEG			2				4		8		17	1	2		4	2		2	6			9
SHIFT					1		1		1		2	1			2	1						
+						1		1														
−																1						
WARN							1		1	1	3	1	1		4	1			1			1
Dyadic Contacts—																						
Child Created																						
Work-related																						
CONT & PROC	19	12	179	34	17	28	339	64	7	9	154	48	9	14	98	21	15	7	112	8	1	19
+		2	13	3	3	3	32	5	1		12						2		8			
−		1	4	2											4							
DELAY	4		18	5	1	3	23	4			9	10		1	11	13			6	2		2
BRIEF	11	11	86	28	12	14	197	37	5	3	99	25	8	12	67	18	11	6	67	4		10
LONG	4	1	75	1	4	11	119	23	3	6	49	13	3	4	38	6	4	1	39	2	1	7
?		1	3	2		1	8	7	1	1	7	6	3	4	24	5			3			
Personal-related																						
EXP	4	4	29	5	6	2	35	9			2			1	1	3	1	1	25			13
PROC	3	9	33	15	4	4	51	10	5	6	27	16	1	3	7	4	2	3	25	1	2	13
ACK	3	9	34	10	6	3	40	14			3					2	2	1	31			15

	Teacher																					
	1.1				1.2				3.1				3.2				6.1			6.2		
Variable	LA Lesson 1	M Lesson 2	All Lang Arts	All Math	LA Lesson 1	M Lesson 2	All Lang Arts	All Math	LA Lesson 1	M Lesson 2	All Lang Arts	All Math	LA Lesson 1	M Lesson 2	All Lang Arts	All Math	LA Lesson 1	LA Lesson 2	All Lang Arts	LA Lesson 1	LA Lesson 2	All Lang Arts
GRANT	1	3	19	8	3	2	36	3	5	2	22	7		2	4	3	1	2	13	1	2	11
DELAY	2		3				4				1			1	1	2			4			
NGRANT	1	1	6	2	1	1	5	2		4	3	9	1	2	3	2		1	2			
Teacher Afforded																						
Work-related																						
‡	4	4	48	17	2	3	10	9	4	6	32	9		2	4	2	11	2	32	8		8
=	1	2	15	6			4					1			1		1		1			
?																						1
OBSV		2	40	35	1	12	7	12	7		44	4		1	4	1	6	11	33	7		8
BRIEF	6	28	155	92	5	8	52	20	3		69	5		2	6	2	12	9	63	5		20
LONG	19	18	174	52	2	9	69	12	2	1	78	9		13	8	13	5		31	11		21
Personal			16	1	6	1	7	1			1						2	2	13	1		14
Proc-related																						
FAVOR	3	1	12	1			9		4		9	1			10	2		1	4			9
MANAG	20	11	131	38	8	17	72	37	1	15	92	37	7		61	109	14	5	95	15	13	92
THANKS		1	1	1			3								1		1	1	5			
?	3		5	1			2		2		9			1	1	1						
Behav-related																						
‡	1		5	5		5	1	5	10		22											
NVI	2	2	10	9	1		7		10		15	2			12		3	6	14	3	2	10
WARN	16	17	102	32	6	15	83	24	4	5	56	16	11	2	66	3		1	19	2	4	35
=	5	1	20	3			2				7	2	1	1	16	1						

	Teacher																					
	1.1				1.2				3.1				3.2				6.1			6.2		
Variable	LA Lesson 1	M Lesson 2	All Lang Arts	All Math	LA Lesson 1	M Lesson 2	All Lang Arts	All Math	LA Lesson 1	M Lesson 2	All Lang Arts	All Math	LA Lesson 1	M Lesson 2	All Lang Arts	All Math	LA Lesson 1	LA Lesson 2	All Lang Arts	LA Lesson 1	LA Lesson 2	All Lang Arts
NO ERROR	16	10	94	29	7	13	65	20	4	3	45	13	11	2	60	3		1	19	1	4	30
TARG		1	6	2			2		1	1	4	2			2							
TIM	7	6	19	8		2	21	4	3	1	9	1										3
?											5				6							
OVERT		1	5	2											3					1		2

APPENDIX P

DISTRIBUTIONS OF TEACHER-SELECTED STIMULUS POINTS

Distributions of Teacher-selected Stimulus Points

Stimulus Point	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
Correcting, checking pupil work		1		1								
Counting of pupil votes (raised hands) by teacher					1							
Collecting material used in lesson				1								
Choice of student for 'show & tell'			2									
Dyadic teacher-pupil contacts												
Child created: attempted		1				1						
work-related	5	2	1	2		1		6	4	1	1	1
personal	2	3		1	3			3				2
procedural	1											
Teacher afforded: work-related	2	10		2	2	3		5			9	
procedural	2	2		1		1	2				1	2
behavior-related	4	1	1	4	6		1	1			3	8
Displeasure (explicit) expressed by students with aspect of lesson							1					
Direction giving by teacher	12	3	1	1	10	5	3	2	1		5	3
Distribution of materials by teacher	1	1		1				1				
Deviant behavior							2					
Gestures											1	1
Group of pupils re-enter classroom	1											
Information giving by teacher	1			1	1	2		1	1		8	6
Listening activity					3							
Mocking of student by teacher												1
Monitoring of class, pupil activity	1	1			1							
Movement												
- by student						1			1			
- by teacher	1			1	1	1					2	

	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
Stimulus Point	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
Noise - ambient talk		1				1	2	1		1		
- bell							1					
Observation of event, experiment by students and teacher										1		
Observation of pupil, pupil work	1		1			2	1					
Perception by teacher of pupil, pupil work			1			1	1		1			
Perception by teacher of object, time				1				1				
Physical contact - teacher and pupil					1							
Praise to group, whole class					1							1
Preinstructional plan - reference to						1		1				
Pupil waiting for teacher reaction									1			
Questions												
- process, product, choice	9	1	4	7	4	4	15	15		1	12	16
- self reference			1		2							4
- opinion							2					7
- rephrasing by teacher						1					1	
Reading												
- by pupil									3			
- by teacher								1			2	
Reward and punishment						1						
Search by teacher for pen		1										
Self (teacher)							1					
Show and tell activity			1									
Student initiated comment												
- not called out			2						2	1		
- called out	5		3		1	3	1				1	1
Student initiated question												
- not called out							1		1		1	
- called out	1		2	1	2	1						1
Teacher communication with visitor to classroom	1											
Transition point in lesson from one activity to another		1						1			1	

Stimulus Point	Teacher											
	1.1		1.2		3.1		3.2		6.1		6.2	
	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
Verbal exchange between students			1									
Waiting by teacher for students, for students to settle down	2				1	1	3					
Warning to group about behavior		1		1		1						
Warning about difficulty level of task												1
Writing by teacher on blackboard	2										1	1
	54	30	21	26	40	32	37	39	15	5	49	56